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Prepared by:

Volume I





USCG DRAFT ENVIRONMENTAL IMPACT STATEMENT

FOR

PORT AMBROSE DEEPWATER PORT APPLICATION Volumes 1 and 2

USCG DOCKET NUMBER: USCG-2013-0363

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Liberty Natural Gas, LLC (Liberty) proposes to own, construct, and operate the Port Ambrose deepwater port (Port Ambrose) located in federal waters of the New York Bight. Liquefied natural gas (LNG) would be delivered from purpose-built LNG regasification vessels (LNGRVs), vaporized on site, and delivered through two permanently anchored submerged turret loading buoys (STLTM Buoys), subsea manifolds and lateral pipelines to a buried Mainline connecting to the existing Transcontinental Gas Pipe Line Company (Transco) Lower New York Bay Lateral located in New York State waters. Port Ambrose would be designed to transport an annual average of 400 million standard cubic feet per day (MMscf/d) of natural gas (peak of 650 MMscf/d) from an LNGRV. Port Ambrose is proposed to be located in OCS blocks NK 18-12 6708, NK 18-12 6709, and NK 18-12 6758, approximately 16.1 nautical miles off of Jones Beach, New York and 27.1 nautical miles from the entrance of New York Harbor. The 18.8 nautical mile subsea Mainline is proposed to connect to the existing Transco Lower New York Bay Lateral in New York State waters, approximately 2.2 nautical miles south of Long Beach, New York and 13.1 nautical miles east of Sandy Hook, New Jersey. Port Ambrose would consist of: two STLTM Buoys; two flexible risers; two pipeline end manifolds (PLEMs); and two 26-inch diameter subsea laterals which will connect the PLEMs to the subsea Mainline.

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This document has been prepared in support of the Administrator of the Maritime Administration for purposes of issuing a Record of Decision for this depwater port application license.

Date Responsible Official Chief, Office of Operating and Environmental Standards

Title/Position





DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PORT AMBROSE LNG DEEPWATER PORT LICENSE APPLICATION

Location: New York Bight, approximately 16.1 nautical miles off of Jones Beach, New York in OCS blocks NK 18-12 6708, NK 18-12 6709, and NK 18-12 6758.

Docket Number: USCG-2013-0363

Prepared By: U.S. Coast Guard (USCG) and their contractor, Tetra Tech, Inc. USCG and the Maritime Administration (MARAD) are co-lead Federal agencies.

Cooperating Agencies: U.S. Environmental Protection Agency; U.S. Department of the Interior, Bureau of Ocean Energy Management and U.S. Fish and Wildlife Service; U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS); U.S. Army Corps of Engineers; and U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration.

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Abstract: Liberty Natural Gas, LLC (Liberty) proposes to own, construct, and operate the Port Ambrose deepwater port (Port Ambrose) located in federal waters of the New York Bight. Liquefied natural gas (LNG) would be delivered from purpose-built LNG regasification vessels (LNGRVs), vaporized on site, and delivered through two permanently anchored submerged turret loading buoys (STLTM Buoys), subsea manifolds and lateral pipelines to a buried Mainline connecting to the existing Transcontinental Gas Pipe Line Company (Transco) Lower New York Bay Lateral located in New York State waters. Port Ambrose would be designed to transport an annual average of 400 million standard cubic feet per day (MMscf/d) of natural gas (peak of 650 MMscf/d) from an LNGRV. Port Ambrose is proposed to be located in OCS blocks NK 18-12 6708, NK 18-12 6709, and NK 18-12 6758, approximately 16.1 nautical miles off of Jones Beach, New York and 27.1 nautical miles from the entrance of New York Harbor. The 18.8 nautical mile subsea Mainline is proposed to connect to the existing Transco Lower New York Bay Lateral in New York State waters, approximately 2.2 nautical miles south of Long Beach, New York and 13.1 nautical miles east of Sandy Hook, New Jersey. Port Ambrose would consist of: two STLTM Buoys; two flexible risers; two pipeline end manifolds (PLEMs); and two 26-inch diameter subsea laterals which will connect the PLEMs to the subsea Mainline.

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Executive Summary

Introduction

The Deepwater Port Act of 1974 (DWPA)¹, as amended, establishes a licensing system for ownership, construction, and operation of manmade structures beyond state seaward boundaries. The DWPA promotes the construction and operation of deepwater ports as safe and effective means of importing oil into the United States and transporting oil from the Outer Continental Shelf (OCS), while minimizing tanker traffic and associated risks. In 2002, the Maritime Transportation Security Act² (MTSA) amended the definition of "deepwater port" to include natural gas facilities.

All deepwater ports must be licensed. The DWPA requires a license applicant to submit detailed plans for its facility to the Secretary of Transportation (Secretary). The Secretary has delegated the processing of deepwater port applications to the U.S. Coast Guard (USCG) and the Maritime Administration (MARAD). The USCG retained this responsibility after its transfer to the Department of Homeland Security (DHS). On June 18, 2003, the Secretary also delegated to the Administrator of the MARAD the authority to issue, transfer, amend, or reinstate a license for the construction and operation of a deepwater port. Hereafter, the "Maritime Administrator" refers to the MARAD's Administrator as the delegated representative of the Secretary.

On September 28, 2012, Liberty Natural Gas, LLC (hereinafter referred to as Liberty or Applicant), an indirect wholly-owned subsidiary of West Face Long Term Opportunities Global Master Fund L.P. (West Face Global Master Fund), which is managed by West Face Capital Inc., submitted an application to the USCG and MARAD seeking a federal license under the DWPA, as amended ³, to construct, own, and operate a deepwater port for the import and regasification of liquefied natural gas (LNG) ⁴ in federal waters of the New York Bight. LNG would be delivered from purpose-built LNG regasification vessels (LNGRVs), vaporized on site and delivered through subsea manifolds and lateral pipelines to a buried Mainline connecting to the existing Transcontinental Gas Pipe Line Company (Transco) Lower New York Bay Lateral⁵ in New York State waters. The proposed Port Ambrose Deepwater Port (Port Ambrose Project, Port, or Project), was assigned Docket No. USCG-2013-0363.

The DWPA requires compliance with the National Environmental Policy Act (NEPA) and provides that such compliance shall fulfill the requirement of all federal agencies in carrying out their responsibilities under NEPA. The USCG and MARAD are the leading agencies for the NEPA compliance review for the proposed Project and, consistent with the DWPA, have issued this draft Environmental Impact Statement (EIS). This draft EIS satisfies the requirements of NEPA, the DWPA, USCG Commandant Instruction (COMDTINST) M16475.1D, and the DHS Management Directive 23-01, Environmental Planning

¹ Public Law (P.L.) 93-627, Sec.3, January 3, 1975, 88 Stat. 2127, as amended, codified to 33 U.S. Code (U.S.C.) 1501-1524.

² P.L. 107-295, Section 106, November 25, 2002, 116 Stat. 2064.

³ On December 20, 2012, the Coast Guard and Maritime Transportation Act of 2012 (Title III, Sec. 312) amended Section 3(9)(A) of the Deepwater Port Act of 1974 (33 U.S.C. 1502(9)(A)) to insert the words "or from" before the words "any State" in the definition of Deepwater Port. This amendment grants MARAD the authority to license the construction of Deepwater Ports for the export of oil and natural gas from domestic sources within the United States to foreign markets abroad.

⁴ LNG is natural gas that has been cooled to about minus 260 degrees Fahrenheit (°F) for efficient shipment and storage as liquid. It is more compact than its gaseous equivalent, with a volumetric differential of about 610 to 1.

⁵ The Transco Lower New York Bay Lateral is an existing 26-inch interstate natural gas pipeline that is part of the 10,500-mile Transco pipeline system, which extends from South Texas to New York City. The Lower New York Bay Lateral begins onshore in Middlesex County, New Jersey, continues offshore across Monmouth County, New Jersey and Queens County, New York, and terminates on Long Island, Nassau County, New York.

⁶ P.L. 107-295, Section 106, November 25, 2002, 116 Stat. 2064

Program. The U.S. Department of the Interior (USDOI) Bureau of Ocean Energy Management (BOEM), U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries; also known as National Marine Fisheries Service [NMFS]), U.S. Army Corp of Engineers (USACE), U.S. Environmental Protection Agency (USEPA), and the U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) are cooperating agencies for the purpose of this draft EIS. They may incorporate this draft EIS in their permitting processes.

On April 30, 2013, MARAD issued a *Notice of Policy Clarification Concerning the Designation of Adjacent Coastal States for Deepwater Port License Applications* advising the public that nautical miles shall be used when determining Adjacent Coastal State status.⁷ Pursuant to the criteria provided in the DWPA, New York and New Jersey are the Adjacent Coastal States for the proposed Project. MARAD may not issue a license without the approval of the Governors of the Adjacent Coastal States. The Governors of both Adjacent Coastal States must approve, approve with conditions, or deny the DWPA license within 45 days of the last DWPA public hearing, or, if either Governor does not act within 45 days, approval would be conclusively presumed. Approval or denial of the license application by MARAD must occur not more than 90 days after the last public hearing.

On June 14, 2013, the MARAD issued a Notice of Application in the *Federal Register*, summarizing the Applicant's deepwater port application.⁸ Under procedures set forth in the DWPA, the USCG and MARAD have 240 days from the date of the Notice of Application to hold one or more public license hearings in the adjacent coastal state(s).

On October 21, 2013, the USCG and MARAD issued a letter to suspend the statutory timeline required by the DWPA for 90 calendar days, commencing on October 21, 2013 and ending on January 18, 2014. This timeline suspension was issued to account for data gap and public comment responses, as well as to account for the Federal Government shutdown that occurred during October 2013. During the shutdown, most of MARAD and the USCG deepwater port teams were in a furlough status. On March 7, 2014, this suspension was continued retroactively to January 19, 2014, and indefinitely. This period of suspension was not counted in determining the date prescribed by the time limits set forth in 33 U.S.C. 1504(g) and § 1504(i)(4) of the DWPA.

The Applicant also filed permit applications required under the Clean Air Act (CAA) and Clean Water Act (CWA) with the USEPA. If a DWPA license is issued, the Applicant will apply to the USDOI BOEM for port facilities and a pipeline right-of-way.

Purpose and Need

The purpose for licensing LNG deepwater ports is to provide a reliable and timely supply of natural gas and increase energy diversity, while considering impacts on the environment, safety, and security. Accomplishing the project purpose and need requires construction of appropriate facilities for receiving the LNG, revaporizing the LNG to a gaseous state, and interconnecting the facility to the existing transmission pipeline system, which would distribute the natural gas into the downstate New York City and Long Island markets to meet existing and future demand requirements, particularly during periods of peak winter and summer demand.

The DWPA of 1974, as amended, was passed to promote and regulate the construction and operation of deepwater ports as a safe and effective means of importing oil or natural gas into the United States. The DWPA requires the Secretary to approve or deny a deepwater port license application. In reaching this

⁷ Vol. 78, Federal Register, No. 83, Tuesday, April 30, 2013, pp 25349-51.

⁸ Vol. 78, Federal Register, No. 115, Friday, June 14, 2013, pp 36014-16.

decision, the Secretary must carry out the Congressional intent expressed in the DWPA (33. U.S.C. 1501), which is to:

- "authorize and regulate the location, ownership, construction and operation of deepwater ports in waters beyond the territorial limits of the United States;
- provide for the protection of the marine and coastal environment to prevent or minimize any adverse impact that might occur as a consequence of the development of such ports;
- protect the interests of the United States and those of adjacent coastal States in the location, construction, and operation of deepwater ports;
- protect the rights and responsibilities of the States and communities to regulate growth, determine land use, and otherwise protect the environment in accordance with law;
- promote the construction and operation of deepwater ports as a safe and effective means of importing oil and natural gas into the United States and transporting oil and natural gas from the outer continental shelf while minimizing tanker traffic and the risks attendant thereto; and
- promote oil and natural gas production on the outer continental shelf by affording an economic and safe means of transportation of outer continental shelf oil and natural gas to the United States mainland."

The Congressional intent is codified in nine requirements set forth in 33 U.S.C. 1503(c), as follows:

- The Applicant is financially responsible and will meet the requirements of the DWPA.
- The Applicant can and will comply with applicable laws, regulations, and license conditions.
- Construction and operation of the deepwater port will be in the national interest and consistent with national security and other national policy goals and objectives, including energy sufficiency and environmental quality.
- The deepwater port will not unreasonably interfere with international navigation or other reasonable uses of the high seas, as defined by treaty, convention, or customary international law.
- The Applicant has demonstrated that the deepwater port will be constructed and operated using best available technology, so as to prevent or minimize adverse impact on the marine environment.
- The Secretary has not been informed, within 45 days of the last public hearing on a proposed license for a designated application area, by the Administrator of the USEPA that the deepwater port will not conform with all applicable provisions of the CAA, as amended (42 U.S.C. 7401 et seq.); the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq.); or the Marine Protection, Research and Sanctuaries Act, as amended (16 U.S.C. 1431 et seq., 1447 et seq.; 33 U.S.C. 1401 et seq., 2801 et seq.).
- The Secretary has consulted with the Secretaries of the Army, State and Defense to determine their views on the adequacy of the application, and its effect to programs within their respective jurisdictions.
- The Governor of the Adjacent Coastal State approves, or is presumed to approve, issuance of the license.
- The Adjacent Coastal State to which the deepwater port is to be directly connected by pipeline has developed, or is making at the time the application is submitted, reasonable progress, toward developing an approved coastal zone management program pursuant to the Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. 1451 et seq.).

The DWPA application currently under consideration is one proposed by Liberty Natural Gas, LLC. In its application, Liberty proposes to construct, own, and operate the proposed Project to receive and vaporize LNG and transport natural gas at a geographical location that allows it to connect into the nation's northeast natural gas market via the existing natural gas transmission infrastructure.

Scope and Organization of this Draft EIS

The Secretary (through MARAD and the USCG) is responsible for complying with numerous federal and state regulations, including NEPA. As such, the purpose of this draft EIS is to:

- provide an environmental analysis sufficient to support the Secretary's licensing decision;
- facilitate a determination of whether Liberty has demonstrated that the proposed Project would be located, constructed, operated, and, eventually upon retirement, decommissioned, using the best available technology necessary to prevent or minimize adverse impacts on the environment; and
- encourage and facilitate involvement by the public and interested agencies in the environmental review process.

This draft EIS also assesses the potential environmental impacts associated with the installation, operation, and decommissioning of the proposed Project. The affected environmental resource areas evaluated in this draft EIS include water quality, biological resources, threatened and endangered marine mammals, sea turtles, fish and birds, essential fish habitat, geological resources, cultural resources, ocean uses, land uses, visual resources, socioeconomics, transportation, air quality, noise, and public safety. This draft EIS describes the proposed action and potential alternatives (Section 2.0), the affected environment as it currently exists (Section 3.0), the probable environmental consequences that may result from construction, operation, and decommissioning of the proposed Project (Section 4.0), public safety (Section 5.0), and cumulative and other impacts (Section 6.0).

Where applicable, this draft EIS considers safety but does not function as the final safety evaluation. All aspects of Port safety would be addressed in the Port Operations Manual, which would require USCG approval prior to initiation of deepwater port operations. Financial responsibility is being evaluated within MARAD as a separate task that would be considered along with this draft EIS as part of the final licensing decision.

Public Involvement

Agency and public participation in the NEPA process promotes open communication between the public and the government and enhances decision-making. All persons and organizations having a potential interest in the Secretary's decision whether to grant the license are encouraged to participate in the decision making process.

The USCG and MARAD initiated the public scoping process on June 24, 2013, with the publication of a Notice of Intent (NOI) to prepare an EIS in the *Federal Register*. The NOI included information on public meetings and informational open houses; requested public comments on the scope of the EIS; and provided information on how the public could submit comments by mail, hand delivery, facsimile, or electronic means. The notice also announced the establishment of a public docket, accessible through the Federal Docket Management System (FDMS) website: http://www.regulations.gov under docket number USCG-2013-0363.

An Interested Party Letter, the NOI published in the *Federal Register*, and a fact sheet describing the proposed Project were sent to federal, state, and local agency representatives; and other potentially

⁹ Vo. 78, Federal Register, No. 121, Monday, June 24, 2013, pp 37878-80.

interested parties (see Appendix B). Public comments submitted as part of the scoping process (see Appendix B) were considered during the development of this draft EIS.

As an additional mechanism to facilitate public participation in the scoping process, the USCG and MARAD held an informational open house at the Allegria Hotel, 80 West Broadway, Long Beach, New York, on July 9, 2013, and at the New Jersey Convention and Exposition Center, 97 Sunfield Avenue, Edison, New Jersey, on July 10, 2013. The open houses were attended by 380 recorded individuals 10 (New York 192, New Jersey 188). The closing date of July 14, 2013 for receipt of materials in response to the request for comments was extended until July 23, 2013. This closing date was subsequently extended until August 22, 2013. 2 Some of the attendees also provided oral or written comments either in support of or in opposition to the proposed Project. A total of 52 individuals provided oral comments at the New York open house and 40 individuals provided oral comments at the New Jersey open house. Several of these speakers represented local, regional, and/or national organizations. A total of seven submissions from state and federal agencies, four submissions from local agencies, 78 submissions from companies and organizations, and 895 submissions from individuals were received on the FDMS Docket. Several of the submissions received from companies and organizations were compilations of hundreds of form letters signed by different individuals. Approximately 10,000 form letters were received through this mechanism as well as one petition with a reported signature count of 16,000 individual stakeholders. The written comments on the FDMS Docket generally mirror those received at the public meetings, but also included additional concerns. Transcripts of the meetings are included in Appendix C.

Description of the Proposed Action

The Applicant proposes to own, construct, and operate an offshore deepwater port in federal waters of the North Atlantic in the BOEM OCS blocks 6708, 6709, and 6758, approximately 16.1 nautical miles off of Jones Beach, New York and 27.1 nautical miles from the entrance of New York Harbor. The 18.8 nautical mile subsea mainline (Mainline) is proposed to connect to the existing Transco Lower New York Bay Lateral in New York State waters, approximately 2.2 nautical miles south of Long Beach, New York and 13.1 nautical miles east of Sandy Hook, New Jersey. The proposed Port facilities contained in the USCG and MARAD license application would consist of:

- Two subsea submerged turret loading buoys (STLTM Buoys)
- Two flexible risers
- Two pipeline end manifolds (PLEMs)

The proposed offshore pipeline facilities contained in the USCG and MARAD license application would consist of:

- Two 26-inch-diameter pipeline laterals
- One 18.8 nautical mile, 26-inch-diameter Mainline

Fabrication of offshore components would require onshore facilities. A site on Quonset Point, Rhode Island, and a site on Port of Coeymans, New York have undergone initial review as potential locations for a pipe staging and concrete weight coating (CWC) facility; however, the final location for the pipe staging and CWC facility as well as a construction base, including offices and a warehouse, and a leased boat slip for the support vessel staging area, is still under review.

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¹⁰ Estimates indicate that attendance was closer to 250 individuals per meeting, accounting for those who did not sign in at the registration table

¹¹ Vol. 78, Federal Register, No. 131, Tuesday, July 9, 2013, p. 41190

¹² Vol. 78, Federal Register, No. 136, Tuesday, July 16, 2013, P. 42588.

LNGRVs that would call on the proposed Port facilities would be purpose built to call on STL Buoys. Liberty anticipates that the LNGRVs would be registered under the Norwegian International Ship Register through a long-term agreement with Höegh LNG.

Construction of the proposed Project would be anticipated to take approximately 20 months over two calendar years. Off-site fabrication and pre-construction activities would commence in late 2016 and take approximately 9 to 12 months. Installation of the offshore components would begin in early 2017 and would take approximately nine months to complete. Construction and installation of the proposed Project would be completed in late fourth quarter 2017. The proposed Project would be designed, constructed, and operated in accordance with applicable codes and standards and would have an expected operating life of approximately 25 years.

Alternatives

The DWPA requires the MARAD Administrator to approve, approve with conditions, or deny a deepwater port license application. Consistent with NEPA, in determining the provisions of the license, the Administrator must also consider alternative means to construct and operate a deepwater port. Alternatives for a natural gas deepwater port may extend to matters such as its specific location, methods or location of construction, anchor systems, routes for associated pipelines, foundation types, and technologies for regasification. Considering alternatives helps to ensure that ultimate decisions concerning the license are well-founded and, as required by the DWPA and the nine factors mandated by the DWPA, are in the national interest and consistent with national security and other national policy goals and objectives.

Our evaluation of alternatives is presented in the following sections:

- Deepwater Port Alternatives (Section 2.2.1)
 - o Offshore vs Onshore LNG Alternatives (Section 2.2.1.1)
 - Deepwater Port Design Alternatives (Section 2.2.1.2)
 - o Deepwater Port Location Alternatives (Section 2.2.1.3)
 - Anchor Alternatives (2.2.1.4)
 - o Mainline Alternatives (2.2.1.5)
 - Onshore Pipe Staging and CWC Facility Alternatives (2.2.1.6)
 - o LNG Vaporization Technology Alternatives (Section 2.2.1.7)
- No Action Alternative (Section 2.2.2)
- Energy Alternatives (Section 2.2.3)
 - o Alternative Energy Sources (Section 2.2.3.1)
 - Energy Conservation Alternatives (Section 2.2.3.2)
 - o Alternative Gas Supply Systems (Section 2.2.3.3)

Offshore vs Onshore LNG Alternatives: Congress has passed statutes that distribute responsibility for the development of LNG facilities in the United States across different agencies within the federal government. For offshore LNG facilities in federal waters, the USCG and MARAD jointly share responsibility for evaluating and processing applications submitted under the DWPA. For onshore facilities or those in state waters, the Federal Energy Regulatory Commission (FERC) is responsible under the Natural Gas Act. Proposed onshore and offshore LNG terminal facilities are considered independent of one another (not mutually exclusive); for that reason, they are not considered to represent true alternatives to each other. Although onshore LNG terminals and LNG terminal expansions for import have been considered in the Northeast, they would not provide natural gas to the downstate New York

and Long Island market, which is the stated purpose of the proposed Project. These proposed onshore facilities are discussed further under the No Action Alternative, because they could be developed regardless of the outcome of any proposed DWPA application. Additionally, this draft EIS does not address how many LNG facilities would be needed to meet the growing demand for natural gas in the downstate New York and Long Island market. It is likely that market forces, which include consideration for environmental impacts and associated permitting time and mitigation costs, would ensure that the LNG terminal projects that ultimately would be developed offer the optimal combination of environmental and financial benefits while being consistent with sustainable development in the regions for which they are proposed.

Deepwater Port Design Alternatives: Alternative LNG terminal designs, locations, technologies, and operations were evaluated to determine whether they would be reasonable and environmentally preferable to the proposed action. This analysis was based on the assumption that, irrespective of design type or technologies employed, the LNG terminal would need to be within or near the targeted region if it is to meet the purpose of the proposed Project without requiring substantial upgrades to the existing infrastructure, which would likely result in equivalent or greater environmental impacts than those associated with construction and operation of the proposed Project. Selection criteria mandated that to be considered a reasonable alternative, the proposed Port design must satisfy the following selection criteria:

- meet the Project purpose and need;
- not violate state and federal standards for protecting environmental resources, as established by law and regulation;
- be feasible from an engineering perspective; and
- be reliable.

The designs considered included the (1) gravity-based structure (GBS); (2) platform-based unit; (3) HiLoad port design; (4) floating storage and regasification unit (FSRU); (5) STL Buoy system; and (6) artificial island.

The Applicant proposes the STL Buoy system, using LNGRVs that would be purpose built to call on STL Buoys. Because this design would meet the proposed Project purpose and need, is a proven technology, and meets environmental, engineering feasibility, and reliability criteria, the STL Buoy system is considered to be a reasonable alternative and has been carried forward for detailed analysis in this draft EIS (see Table 2.2-1).

GBS terminals and artificial islands have several significant design disadvantages. These facility types must be sited in shallower water where nearshore habitats, recreational boating and fishing, and the visual landscape would be impacted. Construction of the graving dock facility required to support construction of the GBS would result in additional impacts on coastal resources. Also, GBS terminals have relatively high capital and construction costs compared to other designs. An artificial island would require the filling of up to 100 acres of open ocean. This would also come at a high cost and have a much larger impact area than other designs. For these reasons, the GBS and artificial island concepts were not carried forward for detailed review.

A platform-based unit would be likely to have more frequent interruptions of gas supply due to more operational limitations during heavy weather conditions. Additionally, the platform-based unit would not provide LNG storage facilities unless additional platforms were constructed, resulting in additional environmental impacts. Although the proposed Project does not include storage, the availability of two buoy systems allows for departure and arrival of two LNGRVs allowing for greater reliability. Therefore, the long-term reliability and associated commercial viability of the platform-based unit could fail to meet the objectives of the proposed Project. Thus, platform-based units were not carried forward for detailed review.

The HiLoad port design utilizes an open-loop vaporization system that operates below the water line of a floating platform. Because the HiLoad port design is a floating unit, its impact on the seafloor is minimal, consisting only of a conventional anchoring system. Additionally, the HiLoad anchoring system would not require specific seafloor characteristics and qualities. However, HiLoad port design tests under varying sea states have shown that depths greater than 350 feet are optimal. Recently, Teekay Corporation's *Navion Anglia* commenced sea passage to Las Palmas with their HiLoad Dynamic Positioning No. 1 docked on its port side. This is currently the only commercially used HiLoad unit to date, all other HiLoad uses have been at the testing level. For these reasons, the HiLoad port design was not carried forward for detailed review.

The FSRU is a permanently moored vessel-like barge that can receive, store, and re-gasify LNG for delivery into a pipeline. Typically, the FSRU lacks its own propulsion and requires a robust mooring system that is able to sustain extreme weather conditions including hurricanes. This robust mooring system would result in greater seafloor impacts. Additionally, if damaged during an extreme weather event, disruptions in gas delivery would likely occur while the FSRU is repaired. However, the FSRU proposed for the Calypso Deep Water Port off the Florida coast proposed a self-propelled FSRU that would be moved offshore during extreme weather. A self-propelled FSRU would potentially result in greater air and water impacts during propulsion. For these reasons, a permanently moored FSRU design was not carried forward for detailed review.

Deepwater Port Location Alternatives: There are a large number of locations along the East Coast of the United States suitable for the siting of an LNG terminal, as evidenced by the two deepwater ports already constructed north of the proposed Project and the several proposed and operating onshore LNG terminals along the coast. Liberty has identified lower New York and Long Island as their target market. Therefore, many of the proposed and constructed LNG terminals would not be feasible alternatives since they serve other markets than that proposed by the Applicant.

In identifying a potential site for a LNG deepwater port terminal, applicable USCG siting guidelines (33 CFR 148.720) must be considered. These guidelines indicate that an appropriate site for a deepwater port:

- optimizes location to prevent or minimize detrimental environmental effects;
- minimizes the space needed for safe and efficient operation;
- locates offshore components in areas with stable seafloor characteristics;
- locates onshore components where stable foundations can be developed;
- minimizes the potential for interference with its safe operation from existing offshore structures and activities;
- minimizes the danger posed to safe navigation by surrounding water depths and currents;
- avoids extensive dredging or removal of natural obstacles such as reefs;
- minimizes the danger to the port, its components, and tankers calling at the port from storms, earthquakes, or other natural hazards;
- maximizes the permitted use of existing work areas, facilities, and access routes;
- minimizes the environmental impact of temporary work areas, facilities, and access routes;
- maximizes the distance between the port and its components and critical habitats, including commercial and sport fisheries, threatened and endangered species habitats, wetlands, floodplains, coastal resources, marine management areas, and essential fish habitats (EFHs);
- minimizes the displacement of existing and potential mining, oil, or gas production or transportation uses;
- takes advantage of areas already allocated for similar use, without overusing such areas;

- avoids permanent interference with natural processes or features that are important to natural currents and wave patterns; and
- avoids dredging in areas where sediments contain high levels of heavy metals, biocides, oil or other pollutants or hazardous materials, and in areas designated as wet lands or other protected coastal resources.

The evaluation of alternative deepwater port locations used a screening and site selection process that considered several factors. The selection included the proposed Port's proximity to shipping lanes, water depth requirements, proximity to target market, and proximity to existing offshore natural gas transmission infrastructure. These requirements resulted in four potential alternative sites:

- Study Area A adjacent to the New Jersey coastline and immediately west of the outbound Barnegat Traffic Lane;
- Study Area B located between the Barnegat and the Hudson Canyon Traffic Lanes;
- Study Area C located between the Hudson Canyon and Nantucket Traffic Lanes; and
- Study Area D passes between the Nantucket inbound traffic lane and the Long Island coastline.

These four alternative sites were further evaluated based on safety, engineering, environmental, socioeconomic, vessel traffic, marine hazards and obstructions, commercial and recreational fishing resources, use conflicts, and regulatory concerns. Evaluation of the alternative deepwater port sites using these criteria resulted in the determination that Study Area A was not a viable site. Study Area A did not meet safety or engineering concerns, as this site did not meet minimum water depth requirements, was within 12 nautical miles of the nearest coast, and thus increased socioeconomic and visual impacts, and was determined to be a navigation risk due to LNGRVs crossing the outgoing Traffic Separation Scheme (TSS) while calling on the proposed Project.

Of the remaining alternative deepwater port sites, Study Areas B and C do not require LNGRVs to cross any TSS, as vessels would likely follow existing inbound traffic lanes to approach the Study Area B and C locations, and use outbound traffic lanes during departure. From a safety consideration, Study Area D would require crossing at least one TSS by LNGRVs calling on the proposed Project. Evaluation of engineering criteria has determined that minimum depth requirements are satisfied by Study Areas B, C, and D, considering bathymetry in both areas ranges well over 100 feet. Further seabed evaluations such as geophysical and geotechnical surveys would be required to determine constructability; however, it is anticipated that seabed conditions would be similar at Study Areas B, C, and D. Study Areas B, C, and D also avoid known marine hazards and obstructions. While engineering and seafloor considerations for both sites are similar, the distance of Study Areas B and C is greater than 13 nautical miles; therefore, associated socioeconomic, visual, use conflicts, commercial and recreational fishing, and environmental impacts are likely minimized. However, the associated Mainline route for Study Area B would cross a popular fishing ground referred to as the "Mud Hole" and would be immediately adjacent to a designated pilot transfer area and a disposal area. Proposed Mainline routes C-1 and C-2 avoid known fishing grounds and disposal areas. Based on the above criteria, the Applicant has determined Study Area C to be their proposed Port location.

Anchor Alternatives: Alternative anchor designs were evaluated to determine whether they would be reasonable and environmentally preferable to the proposed Project. Seven environmental and technical considerations were evaluated in this analysis including:

- Air emissions;
- Water use and discharge;
- Turbidity, sedimentation, and seafloor impacts;

- Fisheries impacts;
- Noise impacts;
- Decommissioning impacts; and
- General technical considerations.

Five different anchor designs were considered in the alternatives analysis for the proposed Project. The design alternatives included: (1) suction anchors; (2) driven piles; (3) fluke anchors; (4) gravity-based anchors; and (5) grouted pile anchors.

The Applicant proposes the use of a suction anchor system. Should geotechnical conditions prevent this, the driven pile system would be considered a viable alternative. For each STL Buoy, eight anchors, one for each mooring line, are proposed to moor the systems to the seabed. Final determination of the anchor design would be based on the environmental conditions, the vessels to be moored to the STL Buoys and deep geotechnical tests within the mooring area. Normally, increased soil strength occurs with depth; therefore, the anchors would need the depth to increase their holding capacity. Additional deep geotechnical tests would be required to determine the soil condition at the needed depth for the anchors.

Air emissions and water use and discharge would vary only slightly for each alternative, mostly attributable to the number of support vessels required for construction. Installation of suction, pile, or fluke anchors would result in lower air emissions and water use and discharge due to the decreased number of required ship transits during construction. During installation, all alternatives would have short-term turbidity and sedimentation impacts; however these impacts would be limited to the duration of installation. It is anticipated that driven piles would have the smallest footprint; therefore, installation of driven piles would result in significantly less impact on benthic habitat and fisheries. Installation of a gravity-based anchor system would result in the greatest disturbance due to a larger footprint, followed by the fluke anchor system, which would result in disturbance due to the necessary pulling of the anchor in the seafloor. Gravity-based anchor structures would result in a direct loss of existing fish habitat in a significant area, approximately 2,500 square feet (ft²) per anchor structure. However, the gravity-based anchor system structures would provide a significant amount of hard substrate at different depth which would likely result in an artificial reef sustaining development of new biotic communities that have a potential to support significant marine populations. Such gravity-based anchor reefs would not be available to commercial and recreational fishermen so would not result in any direct positive economic impact.

For suction anchor and gravity-based anchors, sound generated by support vessel and barge movements and the thrusters of dynamic positioning (DP) vessels would be the dominant source of underwater noise during anchor installation activities. An increase in underwater noise would be anticipated with grouted pile anchors, mostly attributable to the use of drilling equipment. Noise impacts are expected to be greatest for driven piles due to the pulsed sounds of the hammer striking the pile. All noise impacts would be temporary for the duration of the installation, approximately 16 days.

During decommissioning, driven pile and grouted pile anchors would be cut below the surface and abandoned in place. There would be a short-term and minor disturbance to surface sediments during this activity. Fluke anchors could be similarly abandoned in place with little disturbance to sediments, or backed out and recovered, resulting in moderate disturbance to sediments, benthic habitat, and increased turbidity. If backed out, the area would recover in a short while and represent pre-construction condition. The suction anchor could also be abandoned in place with little disturbance to sediments, or backed out and recovered, resulting in moderate disturbance to sediments, benthic habitat, zooplankton, and increased turbidity. Backing out the suction anchor, achieved by pumping seawater into the caisson to pressurize and raise the anchor, would also result in further entrainment impacts. It is expected that this impact would be temporary as the area would recover to pre-construction conditions. For gravity-based anchors, it is likely that they would be abandoned in place since it would not be practicable to attempt

recovery. They would however have been transformed into artificial reef habitat over the proposed 30-year Project life expectancy. Because all safety exclusion zones would be removed, these artificial reefs would be available to the public, including divers and commercial and recreational fishermen. Bottom trawling in the proposed Port area would likely still be excluded because of the potential for net entanglement.

Suction anchors are mostly used in clay and fine sediment conditions with few soil stratifications. Installation of the suction anchor system is sensitive to water depth. Driven piles are generally used in sediment conditions consisting of more non-cohesive soil such as sand, silt, and/or more stratified conditions. Driven pile installation is not sensitive to water depth. Fluke anchors can be used in various sediment conditions; however, there are limitations due to the actual anchor location and sediment holding capacity. Holding capacity is dependent upon the level of tensioning. For the proposed Project, tensioning of the anchors up to 700 tonnes would be required. Since the STL mooring anchor requires a characteristic holding capacity of 700 tonnes at the anchors for the mooring systems, the gravity-based anchor system is not a viable alternative. The size of the structure required to achieve the required holding capacity results in the gravity-based anchor being the least favorable alternative. Finally, the grouted pile anchor alternative would be similar to the driven pile system except it would require a different installation method. Selection of this method would be dependent upon seabed composition with rockier, more consolidated soils resulted in the selection of the grouted pile system.

Mainline Alternatives: Two Mainline routes were analyzed for the proposed Project. Selection of the optimal mainline route depends on consideration of any of the same evaluation criteria that were used for evaluation of the Study Areas. Seven environmental and technical considerations were evaluated in this analysis including:

- Engineering;
- Marine hazards and obstructions;
- Socioeconomics;
- Environmental resources;
- Navigation and vessel traffic;
- Commercial and recreational fishing; and,
- Use conflicts.

Both Mainline routes are from Study Area C, which was determined to be the proposed Port location. Mainline routes from Study Area A were eliminated due to inadequate water depth and distance from shore, which would have resulted in additional visual impacts. Mainline routes from Study Area B were eliminated because these routes would require crossing a popular fishing ground referred to as the "Mud Hole" and would be immediately adjacent to a designated pilot transfer area and a disposal area. Mainline routes from Study Area D were eliminated because these routes would require crossing at least one TSS by LNGRVs calling on the proposed Port, as well as a popular fishing ground known as the "Yankee Spot." Additionally, a Mainline route in Study Area D would be nearly twice as long as Mainline routes from Study Area C, which would result in greater seabed impacts, increased turbidity and associated water quality impacts. The Mainline route alternatives considered are as follows:

Mainline Route C-1 – Head northwest from Study Area C for approximately 16.8 nautical miles where it would cross into state waters. From the boundary of state waters, the route would continue northwest for approximately 2.1 nautical miles to the intersection with the Transco Lower New York Bay Lateral; and

Mainline Route C-2 – From Study Area C it would follow along the west side of Mainline Route C-1 avoiding the Cholera Bank fishing area and then merging back into Maine Route C-1 after approximately

15.4 nautical miles. Mainline Route C-2 would then overlap Mainline Route C-1 until the intersection with the Transco Lower New York Bay Lateral.

Although both alternate routes have positive and negative attributes, none has a fatal flaw that would preclude it from being a viable option. As a result, both routes are considered.

Onshore Pipe Staging and CWC Facility Alternatives: Liberty is currently reviewing a site on Quonset Point, Rhode Island, and a site on Port of Coeymans, New York, as potential locations for a pipe staging and CWC facility. Onshore pipe staging and CWC facility alternatives were evaluated using the following criteria:

- 10-12 acres of stabilized land for CWC plants and pipe staging including:
 - o Five (5) acres for plant footprint;
 - o Six (6) acres for pipe laydown and staging; and
 - o Raw material storage including sand, cement and iron ore.
- Stabilized land for ground transport;
- Rail access to receive pipe; and,
- Water access for loading pipe to barges, including:
 - o Minimum requirement of 300 linear feet of water front access;
 - o Dock or bulkhead suitable to support an 80 ton crane; and
 - o Minimum water depth of 12 to 15 feet at the loading area.

The Quonset Point site is located in North Kingstown, Rhode Island, approximately 135 miles north of the Port of New York and New Jersey. The Quonset Business Park® is "designed to provide prime sites for quality industrial development, offices, education, and marine industry, to create new job opportunities for Rhode Island workers; and to be sensitive to the built and natural environment" (Quonset Development Corporation 2011). The Quonset Point location has access to Narragansett Bay, which would accommodate the marine transportation aspect of the construction activities. There has been prior FERC approval for use of this location in other, similar construction projects including the Northeast Gateway Deepwater Port Project (USCG Docket Number USCG-2005-22219) and the HubLine Pipeline Project (FERC Docket Numbers CP01-5-000 and CPC01-5-001).

The Port of Coeymans site is located in the town of Coeymans, New York on the west side of the Hudson River, approximately 155 miles north of New York Harbor, and consists of six possible locations. Five of the locations, located between the Hudson River and Route 115, have been heavily mined, filled and graded in connection with the property's extensive industrial history. The sixth location, located on the east side of Route 114, is a large, mostly level field. The Port of Coeymans Marine Terminal is a 400-acre marine terminal that offers dock capability for ships up to 750 feet with a draft of 32 feet. The Port of Coeymans Marine Terminal offers heavy lift capacity, barge rentals, tug services, specialty lifts, stevedoring services, trucking, dredging and dock rehabilitation and is a secure Maritime Security Level facility. The Port of Coeymans site has been used for many of the same functions and uses as would be required for the proposed Project including a large prefabrication project, the Willis Avenue Bridge, for New York City (Port of Coeymans Marine Terminal 2014).

Both onshore pipe staging and CWC facility locations would meet the key size and water access requirements and are therefore considered to be viable sites. The Quonset Point facility has FERC prior approval for the proposed type of use and accessibility for the proposed Project. Use of either alternative would be consistent with the designated land use and planning for the property and adjacent properties. Since all of the onshore construction yard sites are located at existing industrial facilities, the following environmental resources would not be impacted: biological, cultural and geological resources; recreation

and aesthetics; transportation; noise; land and ocean use. Liberty is continuing to review additional sites suitable locations for a pipe staging and CWC facility as well as a construction base, including offices and a warehouse.

LNG Vaporization Technology Alternatives: LNG must be vaporized and converted to natural gas. Several technologies are commercially available for LNG regasification. For this draft EIS, ambient air vaporization (AAV), shell-and-tube vaporization (STV), submerged combustion vaporization (SCV), and open rack vaporization (ORV) technologies were analyzed. Based on this review, only the STV technology was considered reasonable for use on the LNGRVs. Two system alternatives are available for this process; open-loop and closed-loop. The primary difference between the two systems is that the closed-loop system does not require the intake or discharge of seawater whereas the open-loop system uses a once-through system requiring both intake and discharge of seawater during operation. Under the open-loop system approach, seawater is pumped through a heat exchanger to warm an intermediate fluid, such as propane or a water/glycol mixture. The intermediate fluid is then circulated over a tube bundle containing LNG. The heated intermediate fluid vaporizes the LNG and is returned to the seawater heat exchanger to be reheated. To prevent marine growth, the use of biocides as anti-fouling agents are employed. The open-loop system would use large volumes of seawater, approximately 13,944 to 27,932 gallons per minute (gpm) as an indirect heat source for LNG vaporization. This intake, and ultimate discharge, could have impacts on marine biota. The intake of seawater could impinge or entrain organisms while the discharge of cooled, treated seawater could affect marine life and water quality. In addition, the lower seawater temperatures in the Atlantic during the fall and winter could affect the efficiency of the open-loop system and require supplemental heating to vaporize the LNG, thereby resulting in additional air impacts.

A closed-loop system would generate slightly more air impacts than an open-loop system, but would not have any intake or discharge of seawater. The closed-loop system relies on the combustion of natural gas to heat and vaporize the LNG. Closed-loop systems typically burn up to 1.5 percent of the LNG throughput and allow for some efficiency in the recovery of boil-off gas (BOG). Though they do have additional emissions, particularly nitrogen oxides (NOx), control devices are available to greatly reduce those emissions.

The closed-loop STV system would ultimately result in fewer impacts on marine systems and water quality. Though this system could result in greater air emissions, it is likely that the open-loop system would result in additional air emissions from supplemental heating required during the colder months, often when additional supply would be required for the target market. Therefore, the closed-loop system was chosen as the environmentally preferable vaporization process.

Alternative Energy Sources:

Non-Renewable Alternative Energy Sources: There are several additional non-renewable sources of energy that could be used to meet the lower New York and Long Island market's energy needs. These sources would include coal, oil and nuclear. Fuel oil and coal have a higher output of air pollutants than natural gas. In addition, these fuel sources would result in secondary impacts associated with their production (coal mining and oil drilling), transportation (oil tankers, rail cars and pipelines) and refinement. Nuclear power development is costly and involves a lengthy permitting process that is not consistent with the purpose and need identified for the proposed Project. There are currently three operating nuclear power plants in the vicinity of the proposed Project; Entergy's Indian Point Nuclear Generating Station, Dominion's Millstone Nuclear Generating Station, and Exelon's Oyster Creek Nuclear Generating Station. While licenses remain active at these facilities, energy generation from these facilities is likely to remain stable. None of these facilities have plans to expand at this time. Regulatory requirements, cost considerations, and public concerns make it unlikely that new power plants would be sited and developed to serve the target market. Recent developments have also resulted in the increase in domestic natural gas; however, the target market does not have sufficient infrastructure to transport this

additional supply to the end users. Failure to provide additional natural gas to the target market, especially during peak periods, could result in price volatility and shortages. Alternative arrangements to obtain natural gas would require construction of new LNG import or natural gas pipeline facilities in other locations. If such facilities were approved and constructed, each would result in its own set of specific impacts.

Renewable Alternative Energy Sources: In 2012, renewable energy capacity in the state of New York comprised approximately 19 percent of New York's total capacity of 39,000 megawatts. Of the 19 percent, 15 percent was provided by hydroelectric power, 3 percent was produced by wind, and 1 percent was produced through other renewable energy sources. Data from the New York Independent System Operator indicate that only 3 percent of total capacity for the target market is produced through renewable sources (NYISO 2012). Several offshore wind facilities have been proposed along the Atlantic Coast including Cape Wind, Garden State Offshore Energy, Deepwater Block Island Wind Farm, and Fisherman's New Jersey. In addition to these proposals, the Long Island – New York City Offshore Wind Collaborative has submitted a lease application with the BOEM in September 2011. In July 2014, BOEM issued a Proposed Sale Notice to announce the potential sale of 343,833 acres offshore New Jersey for commercial wind energy leasing. A Final Sale Notice is being prepared and BOEM anticipates holding an auction in 2015. BOEM issued a commercial wind lease to Bluewater Wind Delaware, LLC in 2012 for a lease area of 96,430 acres. The lease provides for a site assessment term of 5 years and an operations term of 25 years. In addition to offshore wind facilities, New York has approximately 1,348 megawatts (approximately 3 percent of state's capacity) in land-based wind capacity. Wind power, like solar, is intermittent and cannot be scheduled based on demand. Therefore, it is possible that during times of peak energy needs, these sources would not be available to provide the additional energy required. A pilot commercial license was issued by the FERC for the Verdant Power Roosevelt Island Tidal Energy Project in January 2012. While Verdant Power plans to expand the capacity in the future, the current technology at this location has not been developed for large-scale production. Therefore, at this time it cannot meet the short-term energy demands that would be met by the proposed Project.

Energy Conservation Alternatives: Energy conservation measures will likely continue to play an increasingly prominent role in offsetting the target market's increasing energy demand. Several programs have increased energy efficiency in the Northeast; including the conversion of residential, commercial, and industrial heating and appliance applications from electricity (often produced by coal or oil) and oil to natural gas. In addition, the New York State Energy Research and Development Authority offers a wide range of programs for residents and businesses to become more energy efficient. While energy conservation measures will be important elements in addressing future energy demands for the target market, energy conservation will reduce the energy demands of the target market by only a small fraction for the foreseeable future. Therefore, energy conservation would not replace the need for the proposed Project.

Alternative Gas Supply Systems: Five existing natural gas pipelines and four existing LNG terminals and deepwater ports are currently located within the New York region or along the east coast. Two additional LNG import terminals have been approved by the FERC or currently have an application filed with the FERC. There are other existing or proposed natural gas pipelines and LNG terminals in other parts of North America, including the Mid-Atlantic market. However, these are not considered alternatives as their location, in combination with the existing interstate pipeline infrastructure, would not provide reasonable access to the lower New York and Long Island market, which is the target market of the proposed Project.

Other LNG Import Terminals: There are currently four operating LNG import terminals and deepwater ports along the East Coast, including Everett, Massachusetts; Cove Point, Maryland; Northeast Gateway offshore in Massachusetts Bay; and Elba Island Terminal. The Neptune LNG offshore of Gloucester, Massachusetts has been granted a five-year suspension of operations by MARAD. One proposed

LNG terminal, Downeast LNG, Robbinston, Maine, would be constructed along the East Coast. On June 25, 2014, Downeast LNG announced it is modifying its proposed natural gas terminal to function as both an import and export (bi-directional) facility. FERC authorized Downeast LNG to initiate environmental pre-filing actions. None of the terminals are located within the proposed Project's target market.

Environmental Consequences and Mitigation

Implementation of the proposed action or the alternatives would result in a combination of adverse and beneficial impacts of varying duration and severity. The following summarizes the environmental consequences and mitigation measures identified in this draft EIS.

Water Resources: The Region of Influence (ROI) for impacts on water resources includes the area within and directly adjacent to the proposed Port location and Mainline route that could be affected by the proposed Project. Construction, operation, and decommissioning of the proposed Project is expected to have no significant impact on the physical oceanography of the New York Bight. Any impact that does occur would be minor and localized. Salinity, temperature, dissolved oxygen (DO), turbidity, trace elements and other parameters, and human-related discharges were evaluated in this draft EIS. These characteristics are determined on a case-by-case basis and do not refer to a rigid time period. In general, long-term impacts would occur either continually or periodically throughout the life of the proposed Project.

<u>Proposed Action:</u> Water quality impacts during construction would consist primarily of short-term increases in turbidity associated with bottom sediment disturbances during proposed Mainline lowering/backfilling and during the installation of the STL Buoy systems. Other short-term minor water quality impacts would be anticipated in association with routine discharges from the construction vessels and the discharge of proposed Mainline hydrostatic test water at the PLEM locations in federal waters. Operation of the proposed Port facilities would be expected to result in short-term minor adverse water quality impacts resulting from sediment disturbance and turbidity caused by riser pipe movement and STL Buoy anchor chain movement, as well as accidental releases of petroleum products, LNG, and/or other chemicals. Water quality impacts associated with decommissioning would be similar in nature to those associated with the original construction, but the extent of the impacts would be substantially less. The recovery of the STL Buoys, PLEMs, flexible risers, and control umbilicals would result in localized turbidity from disturbances on the seafloor. Vessels used during decommissioning would have routine vessel discharges and the potential for accidental releases, but since the proposed Mainline would be abandoned in-place, the extent of the impacts would be over a much smaller area than that associated with the original construction. Decommissioning activities would result in highly localized, short-term, minor impacts on water quality and the aquatic environment.

<u>Alternative Deepwater Port Design:</u> The impacts on sediments from the deepwater port alternatives would be more varied. The GBS, the platform-based unit, and the artificial island generally would result in a greater disturbance of sediments due to the larger footprint on the sea bottom. The FSRU, HiLoad, and the STL Buoy alternatives each would result in a smaller sea bottom footprint and less sediment disturbance during construction. However, the HiLoad design requires deeper water depth resulting in the need for a longer pipeline with more bottom disturbance. In addition, during operation these alternatives could result in increased long-term turbidity due to anchor cable sweep.

<u>Alternative Anchor Design:</u> During installation, all alternatives of anchoring would have short-term turbidity and sedimentation impacts owing to various methods used to set the anchors at or below the sea bottom surface. These impacts would only occur throughout the duration of installation. The amount of water use and discharge would be mostly dependent upon the specific number of vessels that are needed for each alternative. Water use and discharges would likely be less for the fluke and driven pile alternatives than the gravity-based anchor installation. The suction anchor method creates its own issue as

to water "intake and discharge," as seawater would be pumped out of the caisson in order to create the negative pressure needed. Because the seawater would be untreated, negligible impacts on water quality would occur. Support vessel impacts on water use and discharge from suction anchors would be no different than with fluke and driven pile alternatives.

Alternative Deepwater Port Locations and Associated Alternative Mainline Routes: Construction impacts on water quality associated with all alternative Project locations would be similar to those described for Study Area C, which the Applicant has determined to be their proposed Port location. However, Study Area C would require approximately 24 nautical miles less trenching and pipeline installation than an alternative port site in Study Area D. This shorter distance would result in a greater than 50 percent reduction in sediment disturbance and local turbidity from trenching activities. In addition to reducing the total disturbed sediments, the shorter length of installed pipeline would result in a shorter construction time and a reduced potential for accidental spills or other releases from vessels during the construction. The operational and decommissioning impacts on water quality would be the same as those described for Study Area C.

<u>Vaporization Alternatives:</u> Based on the selection of the proposed Port facilities design, there are two alternatives for vaporization of the LNG prior to it entering the proposed Mainline. The alternatives are open-loop vaporization and closed-loop vaporization, and neither would have an impact on sediments. Open-loop vaporization would require substantial water intake (between 13,944 and 27,932 gpm), the potential use of biocides, and the discharge of colder than ambient temperature water. Closed-loop vaporization requires no intake or discharge of water near the proposed Port facilities. Therefore, closed-loop vaporization is the environmentally preferred method.

Biological Resources: Short-term to long-term, minor to potentially major, adverse impacts would occur as a result of construction, operation, and decommissioning of the proposed Project or the alternatives. Plankton, fisheries resources, non-threatened and non-endangered marine species, and birds were evaluated for this draft EIS.

<u>Proposed Action:</u> Construction of the proposed Project would result in short-term, minor, adverse impacts on biological resources from routine discharges, increased vessel traffic, noise, lighting, marine debris, bottom sediment disturbance, hydrostatic testing, and inadvertent spills. Short-term, minor to moderate, adverse impacts on non-threatened and non-endangered marine mammals during construction would result from marine noise from proposed Mainline installation and STL Buoy anchoring. Operation of the proposed Project would result in short- to long-term, minor to moderate, adverse impacts on biological resources from increased vessel traffic, noise, lighting, marine debris, routine discharges, LNG spills, inadvertent spills, bottom sediment disturbance, marine facilities and proposed Mainline presence, and seawater intake (impingement and entrainment). Decommissioning of the proposed Project would result in short-term, minor, adverse impacts on biological resources from routine discharges, increased vessel traffic, noise, lighting, marine debris, inadvertent spills, and bottom sediment disturbance. Such impacts would be similar to those described for construction. Impacts associated with the proposed Project would not be expected to degrade commercial, recreational, ecological, or scientific importance of any biological resource, nor would it cause any measurable change in population size or distribution for any species in the area.

<u>Alternative Deepwater Port Design:</u> The impacts on biological resources from the deepwater port alternatives are varied. The GBS, the platform-based unit, and the artificial island generally would result in a greater disturbance of sediments due to the larger footprint on the sea bottom, as well as permanent conversion of soft bottom habitats to hard structure. The FSRU, HiLoad, and the STL Buoy alternatives each would result in a smaller sea bottom footprint and less sediment disturbance during construction. However, the HiLoad design requires deeper water depth resulting in the need for a longer pipeline with more bottom disturbance. In addition, during operation these alternatives could result in increased long-

term turbidity due to anchor cable sweep. Impacts on biological resources from increased vessel activity, water use, noise and light would likely be similar for all alternative designs.

Alternative Anchor Design: During installation, all alternatives of anchoring would have short-term turbidity and sedimentation impacts owing to various methods used to set the anchors at or below the sea bottom surface. It is anticipated that driven piles would have the smallest footprint. Installation of a gravity-based anchor system would generally result in a greater disturbance of the sea bottom and more overall loss of benthic habitat than other types of anchors. The fluke anchor system would likely have the next greatest impact due to "setting" the anchor by pulling it into the seafloor. The driven pile and grouted pile anchor designs present a relatively smaller seafloor footprint and, therefore, would potentially result in significantly less of an effect to benthic habitat. Gravity-based anchor structures would result in a direct loss of existing fish habitat in a significant area (each approximately 2,500 ft²). Other anchor designs present smaller environmental footprints and, therefore, would potentially result in significantly less of an effect to benthic habitat. Suction anchors, by virtue of pumping out the water from inside the caisson, would have an impact on the zooplankton within that water column, which the other alternatives avoid. On the other hand, gravity-based anchor system structures would provide a significant amount of hard substrate at different depths as it protrudes above the seafloor. This would likely result in an artificial reef sustaining development of new biotic communities that have a potential to support significant marine populations. Such gravity-based anchor reefs would be unavailable to commercial and recreational fishermen; therefore, this would not result in any direct positive economic impact.

Alternative Deepwater Port Locations and Associated Alternative Mainline Routes: The selected alternative deepwater port locations (Study Areas B and D) would be within the same general vicinity as the proposed Port location (Study Area C), and construction, operation, and decommissioning activities would be similar for all locations; however Mainline routes to Study Areas B and D would require crossing of popular fishing grounds. Additionally, a Mainline route to Study Area D would be nearly twice as long as Mainline routes to Study Area C, which would result in greater seabed impacts, increased turbidity and associated water quality impacts.

<u>Vaporization Alternatives:</u> Based on the selection of the proposed Project design, there are two alternatives for vaporization of the LNG prior to it entering the proposed Mainline. The alternatives are open-loop vaporization and closed-loop vaporization, and neither would have an impact on benthic environments. Open-loop vaporization would require substantial water intake (between 13,944 and 27,932 gpm), the potential use of biocides, and the discharge of colder than ambient temperature water, which would adversely impact fisheries resources due to impingement and entrainment. Seawater intake would not be required by any of the closed-loop vaporization alternatives; thus, eliminating impacts on ichthyoplankton and fisheries that would be caused by an open-loop vaporization system.

Threatened and Endangered Marine Mammals, Sea Turtles, Fish, and Birds: Short-term to long-term, minor to moderate, adverse impacts would occur as a result of construction, operation, and decommissioning of the proposed Project or the alternatives; however, negligible on Endangered Species Act (ESA)-listed species would be expected to occur with associated onshore facilities. Threatened and endangered marine mammals, sea turtles, fish, and birds were evaluated for this draft EIS.

<u>Proposed Action:</u> Construction of the proposed Project would result in short-term, minor, adverse impacts on threatened and endangered marine species from routine discharges, increased vessel traffic, noise, lighting, marine debris, bottom sediment disturbance, entanglement, and inadvertent spills. Short-term, moderate, adverse impacts on threatened and endangered marine mammals during construction would result from marine noise from proposed Mainline installation and STL Buoy anchoring. Operation of the proposed Project would result in short- to long-term, minor to moderate, adverse impacts on threatened and endangered marine species from increased vessel traffic, noise, lighting, marine debris, routine discharges, LNG spills, inadvertent spills, bottom sediment disturbance, and proposed Project facilities and Mainline presence. Although a permanent impact on approximately 3.2 acres of seafloor would be

expected in the area of the proposed Port facilities due to buoy placement, impacts beyond the permanent footprint of the proposed Project would be anticipated to be short-term and minor. Short-term, minor, adverse impacts on threatened and endangered marine species during decommissioning would result from routine discharges, increased vessel traffic, noise, lighting, marine debris, inadvertent spills, and bottom sediment disturbance. Such impacts would be similar to those described for construction.

Alternative Deepwater Port Design: The impacts on ESA-listed marine mammals, sea turtles, fish, and birds from the deepwater port alternatives would be varied. The GBS, the platform-based unit, and the artificial island generally would result in a greater disturbance of sediments due to the larger footprint on the sea bottom, as well as permanent conversion of soft bottom habitats to hard structure. The FSRU, HiLoad, and the STL Buoy alternatives each would result in a smaller sea bottom footprint and less sediment disturbance during construction. However, the HiLoad design requires deeper water depth resulting in the need for a longer pipeline with more bottom disturbance and the potential for increased duration of construction vessel activity. In addition, during operation these alternatives could result in increased long-term turbidity due to anchor cable sweep. Impacts on threatened and endangered species from increased vessel activity, water use, noise and light would likely be similar for all alternative designs.

Alternative Anchor Design: During installation, all alternatives of anchoring would have short-term turbidity and sedimentation impacts owing to various methods used to set the anchors at or below the sea bottom surface. It is anticipated that driven piles would have the smallest footprint. Installation of a gravity-based anchor system would generally result in a greater disturbance of the sea bottom and more overall loss of benthic habitat than other types of anchors. The fluke anchor system would likely have the next greatest impact due to "setting" the anchor by pulling it into the seafloor. The driven pile and grouted pile anchor designs present a relatively smaller seafloor footprint and, therefore, would potentially result in significantly less of an effect to benthic habitat. Gravity-based anchor structures would result in a direct loss of existing fish habitat in a significant area (each approximately 2,500 ft²). Other anchor designs present smaller environmental footprints and, therefore, would potentially result in significantly less of an effect to benthic habitat. Suction anchors, by virtue of pumping out the water from inside the caisson, would have an impact on the zooplankton within that water column, which the other alternatives avoid. On the other hand, gravity-based anchor system structures would provide a significant amount of hard substrate at different depths as it protrudes above the seafloor. This would likely result in an artificial reef sustaining development of new biotic communities that have a potential to support significant marine populations. Such gravity-based anchor reefs would be unavailable to commercial and recreational fishermen; therefore, this would not result in any direct positive economic impact.

<u>Alternative Deepwater Port Locations and Associated Alternative Mainline Routes:</u> The selected alternative deepwater port locations would be within the same general vicinity as the proposed Project location, and construction, operation, and decommissioning activities would be similar for all locations. As such, impacts on threatened and endangered marine mammals, sea turtles, fish and birds at the alternative deepwater port locations would be similar to those evaluated for the proposed Project location.

<u>Vaporization Alternatives:</u> Based on the selection of the proposed Project design, there are two alternatives for vaporization of the LNG prior to it entering the proposed Mainline. The alternatives are open-loop vaporization and closed-loop vaporization, and neither would have an impact on benthic environments. Open-loop vaporization would require substantial water intake (between 13,944 and 27,932 gpm), the potential use of biocides, and the discharge of colder than ambient temperature water which would adversely impact local prey resources due to impingement and entrainment. Seawater intake would not be required by the any of the closed-loop vaporization alternatives; thus, eliminating impacts on prey species that would be caused by an open-loop vaporization system.

Essential Fish Habitat: Highly localized direct impacts within the footprint of the ROI, ranging from short- to long-term, would occur as a result of the proposed Project construction, operation, and

decommissioning or the alternatives. The context, intensity, and duration of potential direct, indirect and cumulative impacts of the proposed Project on the relevant life history stages of EFH-designated species, their habitats, and their prey species that may occur in the ROI were evaluated for this draft EIS.

<u>Proposed Action:</u> Construction, operation, and decommissioning of the proposed Project would have no significant impact on a number of designated EFH species. However, direct, short-term impacts from these activities are expected via displacement from the water column to designated EFH species. In addition, direct and short- to long-term impacts from construction, operation, and decommissioning have the potential to exist from the displacement of benthic habitat. Construction, operation, and decommissioning of the proposed Project would have no significant impact on EFH within the ROI. Impact that does occur would be highly localized direct impacts within the footprint of the proposed Project ranging from short- to long-term on the habitat and associated prey species for the duration of activities. However, since the ROI represents only a very small portion of this type of available offshore benthic and water column EFH in the New York Bight, only a commensurately small portion of available EFH would be potentially exposed to adverse impacts.

<u>Alternative Deepwater Port Design:</u> The impacts on EFH from the deepwater port alternatives would be varied. The GBS, the platform-based unit, and the artificial island generally would result in a greater impact on EFH due to the larger footprint on the sea bottom, as well as permanent conversion of soft bottom habitats to hard structure. The FSRU, HiLoad, and the STL Buoy alternatives each would result in a smaller sea bottom footprint and less EFH disturbance during construction. However, the HiLoad design requires deeper water depth resulting in the need for a longer pipeline with more bottom disturbance.

Alternative Anchor Design: During installation, all alternatives of anchoring would have short-term turbidity and sedimentation impacts owing to various methods used to set the anchors at or below the sea bottom surface. It is anticipated that driven piles would have the smallest footprint. Installation of a gravity-based anchor system would generally result in a greater disturbance of the sea bottom and more overall loss of benthic habitat than other types of anchors. The fluke anchor system would likely have the next greatest impact due to "setting" the anchor by pulling it into the seafloor. The driven pile and grouted pile anchor designs present a relatively smaller seafloor footprint and, therefore, would potentially result in significantly less of an effect to benthic habitat. Gravity-based anchor structures would result in a direct loss of existing fish habitat in a significant area (each approximately 2,500 ft²). Other anchor designs present smaller environmental footprints and, therefore, would potentially result in significantly less of an effect to benthic habitat. Suction anchors, by virtue of pumping out the water from inside the caisson, would have an impact on the zooplankton within that water column, which the other alternatives avoid. On the other hand, gravity-based anchor system structures would provide a significant amount of hard substrate at different depths as it protrudes above the seafloor. This would likely result in an artificial reef sustaining development of new biotic communities that have a potential to support significant marine populations. Such gravity-based anchor reefs would be unavailable to commercial and recreational fishermen; therefore, this would not result in any direct positive economic impact.

<u>Alternative Deepwater Port Locations and Associated Alternative Interconnect Pipeline Routes:</u> The selected alternative deepwater port locations would be within the same general vicinity as the proposed Project location, and construction, operation, and decommissioning activities would be similar for all locations. As such, impacts on EFH at the alternative deepwater port locations would be similar to those evaluated for the proposed Project location.

<u>Vaporization Alternatives</u>: Based on the selection of the proposed Project design, there are two alternatives for vaporization of the LNG prior to it entering the proposed Mainline system. The alternatives are open-loop vaporization and closed-loop vaporization, and neither would have an impact on EFH. Open-loop vaporization would require substantial water intake (between 13,944 and 27,932 gpm), the potential use of biocides, and the discharge of colder than ambient temperature water,

which would adversely impact EFH-designated species due to impingement and entrainment. Seawater intake would not be required by any of the closed-loop vaporization alternatives; thus, eliminating impacts on EFH-designated species that would be caused by an open-loop vaporization system.

Geological Resources: Geological resources generally would not be affected by the proposed Project. Some localized and short-term disturbance of seafloor sediments would be expected during construction and decommissioning, and long-term disturbance during operations. Regional and local geology, topography, and mineral resources were evaluated for this draft EIS. This evaluation does not address soil resources, because soil resources are located only onshore and no new development of onshore facilities has been proposed.

<u>Proposed Action:</u> Construction, operation, and decommissioning of the proposed Project would not be expected to impact any mineral or paleontological resources, increase the risk associated with any geological hazards (landslides, seismicity, and liquefaction), or alter sediment composition or structure. Construction activities would affect up to 250 acres on the seafloor. The bottom sediment disturbance from the placement of the proposed Project components would result in adverse negligible, short-term impacts on bathymetry and sediments in the proposed Project area. Operation of the proposed Project would result in minor, long-term impacts on bathymetry and sediments in the ROI from anchor chains sweeping the seafloor during raising and lowering of the STL Buoys. The Applicant would conduct geotechnical borehole sampling and testing prior to construction in order to verify the sediment conditions and ensure that no potential hazards would be located at an anchor location or would alter the performance of an anchor. Decommissioning of the proposed Project would result in impacts on bathymetry and sediments that would be similar to those described for construction

<u>Alternative Deepwater Port Design:</u> The impacts on geologic resources from the deepwater port alternatives are varied. The GBS, the platform-based unit, and the artificial island generally would result in a greater disturbance of sediments due to the larger footprint on the sea bottom. The FSRU, HiLoad, and the STL Buoy alternatives each would result in a smaller sea bottom footprint and less sediment disturbance during construction. However, during operation these alternatives could result in increased long-term impacts on bottom sediment due to anchor cable sweep.

<u>Alternative Anchor Design:</u> It is anticipated that driven piles would have the smallest footprint. Installation of a gravity-based anchor system would generally result in a greater disturbance of the sea bottom and more overall loss of benthic habitat than other types of anchors. The fluke anchor system would likely have the next greatest impact due to "setting" the anchor by pulling it into the seafloor. The driven pile and grouted pile anchor designs present a relatively smaller seafloor footprint and, therefore, would potentially result in significantly less of an effect to benthic habitat. These minor short-term impacts would only occur throughout the duration of installation, and the risk of these potential impacts must also be balanced against the effectiveness and reliability of the anchoring system.

<u>Alternative Deepwater Port Locations and Associated Alternative Mainline Routes:</u> The selected alternative Project designs and Mainline route locations are within the same general vicinity as the proposed Port location, and construction, operation, and decommissioning activities would be similar for all locations.

<u>Vaporization Alternatives:</u> Based on the selection of the proposed Project design, there are two alternatives for vaporization of the LNG prior to it entering the proposed Mainline system. The alternatives are open-loop vaporization and closed-loop vaporization, and neither would have an impact on geological resources.

Cultural Resources: There would be potential to impact submerged cultural resources in the New York Bight as a result of the proposed Project. The area of potential effect (APE) for archaeology includes all marine locations that would undergo disturbance due to construction, operation, and decommissioning of

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the proposed Project. Archeological survey reports for the proposed Project and the alternatives have been reviewed by MARAD, New York State Historic Preservation Office (NYSHPO), and New Jersey Historic Preservation Office (NJHPO). Magnetic anomalies, side-scan sonar targets, and subbottom profiler images have been identified that reveal the locations of both submerged cultural resources and areas with high potential to contain submerged cultural resources. If the areas of these target locations cannot be avoided by the proposed Project, then additional assessment would be required to determine if these are cultural resources that meet the criteria to be eligible to the National Register of Historic Places (NRHP).

<u>Proposed Action:</u> Construction of the proposed Project has the potential to impact submerged cultural resources in the APE; however, studies completed within the proposed Port facilities and in state waters concluded that there are not likely to be any potentially significant cultural resources in these areas. Additional analysis is required to determine the significance of potential cultural resources identified during review of remote sensing data collected within the portion of the APE in federal waters. Operation of the proposed Project would have no direct or indirect impacts on cultural resources since no new areas of seafloor would be impacted by operational activities. Decommissioning of the proposed Project would not be expected to result in impacts on submerged cultural resources provided that anchor handling plans and avoidance plans are implemented to avoid all high probability targets, shipwrecks, and paleochannels.

<u>Alternative Deepwater Port Design:</u> The probability for encountering known cultural resources from the alternative deepwater port designs would be similar to that predicted for the proposed Project's design since they would be in the same location. No known cultural resources, including historic shipwrecks, have been identified.

<u>Alternative Anchor Design:</u> It is anticipated that driven piles would have the smallest footprint. Installation of a gravity-based anchor system would generally result in a greater disturbance of the sea bottom and more overall loss of benthic habitat than other types of anchors, which could impact cultural resources. The fluke anchor system would likely have the next greatest impact due to "setting" the anchor by pulling it into the seafloor. The driven pile designs present a relatively smaller seafloor footprint and, therefore, would potentially result in significantly less of an effect to cultural resources. These impacts would only occur throughout the duration of installation, and the risk of these potential impacts must also be balanced against the effectiveness and reliability of the anchoring system.

Alternative Deepwater Port Locations and Associated Alternative Mainline Routes: Analyses and review of side-scan imagery and magnetometer data indicated one target that may represent a significant submerged cultural resource within the APE for Mainline Route C-1 (RCG&A 2012b). If avoidance is not possible, further investigations should be designed and implemented in consultation with MARAD, NYSHPO, and BOEM to determine if the target represents a cultural resource that may be eligible to the NRHP. If the resource that may be affected by the proposed Project proves to be eligible to the NRHP, an appropriate treatment plan should be developed and implemented prior to construction.

Analyses and review of magnetometer data indicated a single target that may represent a significant submerged cultural resource within the APE for Mainline Route C-2 (RCG&A 2012b). No side-scan sonar or subbottom profiler contacts were recorded that could be associated with this one magnetic anomaly. The amplitude and duration of this anomaly suggest that it might represent a buried cultural resource (RCG&A 2012b). If the proposed Project would not avoid this target, then further investigations should be designed and implemented in consultation with MARAD, NYSHPO, NJHPO, and BOEM.

<u>Vaporization Alternatives:</u> Based on the selection of the proposed Project design, there are two alternatives for vaporization of the LNG prior to it entering the proposed Mainline system. The alternatives are open-loop vaporization and closed-loop vaporization, and neither would have an impact on cultural resources.

Ocean Use, Land Use, Recreation, and Visual Resources: A combination of short- and long-term, minor, adverse impacts on ocean use, land use, recreation, and visual resources would be expected during construction, operation, and decommissioning of the proposed Project or the alternatives. The high population and population density of the region result in more intensive use of the surrounding open waters for commerce and recreation, additional development pressure on open and underutilized land, and a stronger focus on protecting recreational and visual resources.

<u>Proposed Action:</u> Construction of the proposed Project would result in short-term, localized, and minor impacts on ocean uses, recreation, and visual resources. Construction of the proposed Project would have no significant impact on land uses as the proposed onshore sites have a history of extensive industrial use. Operation of the proposed Project would result in minor and localized impacts due to enforcement of the Safety Zone, No Anchoring Areas (NAAs), and Area to be Avoided (ATBA). However, oceangoing and commercial vessels are common in the open waters of the New York Bight and local mariners and residents in coastal communities are accustomed to their presence. Decommissioning of the proposed Project would result in similar impacts on ocean uses those expected during construction; however, impacts would be of a lesser extent in both duration and significance.

<u>Alternative Deepwater Port Design:</u> Impacts from the alternative deepwater port designs on ocean use, land use, recreation, and visual resources would be similar to that predicted for the proposed Project design since they would be in the same location. Adverse impacts on commercial and recreational fishing with the alternative deepwater port designs would differ slightly in comparison with the proposed Project because of the smaller area required for the Safety Zone, NAAs, and ATBA, but the differences are not likely to be perceptible. Impacts on visual resources would likely be greater for the GBS, the platform-based unit, the artificial island, and the FSRU due to their inherently larger surface expressions.

<u>Alternative Anchor Design:</u> Since all vessel activities unrelated to the proposed Port would be prohibited within the Safety Zone, impacts on ocean uses would not be materially different between proposed anchoring alternatives. Installation of the gravity-based anchor would result in greater impacts on ocean uses, recreation, and visual resources due to the increased number of required vessel transits during construction.

<u>Alternative Deepwater Port Locations and Associated Alternative Mainline Routes:</u> Evaluation of the alternative deepwater port sites resulted in the determination that Study Area A was not a viable site. Area A did not meet safety or engineering concerns, as this site did not meet minimum water depth requirements, was within 12 nautical miles of the nearest coast, and thus increased socioeconomic and visual impacts, and was determined to be a navigation risk due to LNGRVs crossing the outgoing TSS while calling on the proposed Port.

Of the remaining alternative deepwater port sites, Study Areas B and C do not require LNGRVs to cross any TSS, as vessels would likely follow existing inbound traffic lanes to approach the Study Area B and C locations, and use outbound traffic lanes during departure. From a safety consideration, Study Area D would require crossing at least one TSS by LNGRVs calling on the proposed Port. Evaluation of engineering criteria has determined that minimum depth requirements are satisfied by Study Areas B, C, and D, considering bathymetry in both areas ranges well over 100 feet. Further seabed evaluations such as geophysical and geotechnical surveys would be required to determine constructability; however, it is anticipated that seabed conditions would be similar at Study Areas B, C, and D. Both sites also avoid known marine hazards and obstructions. While engineering and seafloor considerations for both sites are similar, the distance of Study Areas B and C from the shore is greater than 13 nautical miles; therefore, associated socioeconomic, visual, use conflicts, commercial and recreational fishing, and environmental impacts are likely minimized. However, the associated Mainline route for Study Area B would cross a popular fishing ground referred to as the "Mud Hole" and would be immediately adjacent to a designated pilot transfer area and a disposal area. Proposed Mainline routes C-1 and C-2, discussed in

Section 2.2.1.4, avoid known fishing grounds and disposal areas. Based on the above criteria, the Applicant has determined Study Area C to be their proposed Port location.

Mainline routes were not considered for Study Area A, as this site was eliminated from consideration as the site did not meet minimum water depth requirements. Mainline routes from Study Area B would cross a popular fishing ground referred to as the "Mud Hole" and would be immediately adjacent to a designated pilot transfer area and a disposal area. Mainline routes from Study Area D would be nearly twice as long as Mainline routes from Study Area C, which would result in greater seabed impacts, increased turbidity and associated water quality impacts. Therefore, Mainline routes from Study Areas B and D were eliminated from consideration. Mainline Route C-2 would have similar impacts as the Mainline Route C-1 because it also crosses the Nantucket to Ambrose/Ambrose to Nantucket Traffic Lanes and the separation zone. Crossing of the traffic lane would result in temporary impacts during construction of the proposed Project from increased vessel traffic within the TSS, but not significantly over the current number of vessels operating in the New York Bight. The proposed Mainline would not have impacts on visual resources during operation.

<u>Vaporization Alternatives:</u> Based on the selection of the proposed Project design, there are two alternatives for vaporization of the LNG prior to it entering the proposed Mainline system. The alternatives are open-loop vaporization and closed-loop vaporization, and neither would have an impact on benthic environments. Open-loop vaporization would require substantial water intake (between 13,944 and 27,932 gpm), the potential use of biocides, and the discharge of colder than ambient temperature water which would adversely impact recreational and commercial fisheries resources due to impingement and entrainment. Seawater intake would not be required by any of the closed-loop vaporization alternatives; thus, eliminating impacts on recreational and commercial fisheries that would be caused by an open-loop vaporization system. The remaining recreational and aesthetic issues would result in similar impacts as the proposed action.

Socioeconomics: A combination of short- and long-term, negligible, minor to moderate, beneficial and adverse impacts on socioeconomics would be expected during construction, operation, and decommissioning of the proposed Project or the alternatives. Beneficial impacts would be attributed to economic stimulus from onshore fabrication sites, support vessel contracts, and shore-based contracts. Adverse impacts would potentially result from the loss of fishing grounds due to the proposed Project's presence or the alternatives and their established Safety Zone, NAAs, and ATBA. Commercial and recreational fisheries, marine-based tourism and recreation, marine commerce and shipping, and OCS resources were evaluated for this draft EIS.

<u>Proposed Action:</u> Construction of the proposed Project would result in short-term, localized, adverse, and reversible impacts on offshore economic conditions due to the establishment of the Safety Zone and adverse impacts on fisheries; however, impacts on onshore economic conditions would be short-term, moderate, and beneficial. Operation of the proposed Project would result in negligible, long-term, adverse impacts on offshore economic conditions; however, impacts on onshore economic conditions would be long-term, minor and beneficial. Decommissioning of the proposed Project would produce similar disturbance impacts as previously described for construction activities with adverse impacts on offshore economics conditions and beneficial impacts on onshore economic conditions.

<u>Alternative Deepwater Port Design:</u> Impacts from the alternative deepwater port designs on socioeconomics would be similar to that predicted for the proposed Project's design since they would be in the same general vicinity. Adverse impacts on commercial and recreational fishing would be similar for the GBS, the platform-based unit, HiLoad, and FSRU when compared with the proposed Project, considering the Safety Zone, NAA, and ATBA would each likely be similar in acreage. The artificial island design would inherently require a larger area and would also likely require longer construction duration and manpower during installation than the other alternatives.

<u>Alternative Anchor Design:</u> It is anticipated that driven piles would have the smallest footprint of the alternative anchor designs considered in this draft EIS. Installation of a gravity-based anchor system would generally result in a greater disturbance of the sea bottom and more overall loss of benthic habitat than other types of anchors, which could impact commercial fisheries. The fluke anchor system would likely have the next greatest impact due to "setting" the anchor by pulling it into the seafloor. The driven pile and grouted pile anchor designs present a relatively smaller seafloor footprint and, therefore, would potentially result in significantly less of an effect to commercial fisheries. These impacts would only occur throughout the duration of installation and the risk of these potential impacts must also be balanced against the effectiveness and reliability of the anchoring system.

Alternative Deepwater Port Locations and Associated Alternative Mainline Routes: The alternative Project locations would have similar impacts on socioeconomics as the proposed Project location. Alternative Project locations in Study Areas B and D would have greater direct impacts on economic resources such as fishing and tourism due to proximity to known fishing grounds (Study Areas B and D) and the coast (Study Area D). The alternative Project location in Study Area D is located approximately 12 nautical miles from the coastline of Long Island, while the proposed Project location is 16.1 nautical miles from the coastline. By locating the visible components of the proposed Project at the alternative port location, the proposed Project would have greater impacts on visual resources and therefore indirect impacts on socioeconomics.

Mainline Route C-2 would have similar impacts as Mainline Route C-1 because it also crosses the Nantucket to Ambrose/Ambrose to Nantucket Traffic Lanes and the separation zone. Crossing of the traffic lane would result in temporary impacts during construction of the proposed Project from increased vessel traffic within the TSS, but not significantly over the current number of vessels operating in the New York Bight. Mainline routes C-1 and C-2 would not have impacts on socioeconomics during operation.

<u>Closed-Loop Vaporization Alternatives:</u> Based on the selection of the proposed Project design, there are two alternatives for vaporization of the LNG prior to it entering the proposed Mainline system. The alternatives are open-loop vaporization and closed-loop vaporization, and neither would have an impact on socioeconomics. Open-loop vaporization would require substantial water intake (between 13,944 and 27,932 gpm), the potential use of biocides, and the discharge of colder than ambient temperature water which would adversely impact recreational and commercial fisheries resources due to impingement and entrainment. Seawater intake would not be required by any of the closed-loop vaporization alternatives; thus, eliminating impacts on recreational and commercial fisheries that would be caused by an open-loop vaporization system. The remaining recreational and aesthetic issues would result in similar impacts as the proposed Project.

Transportation: The New York and New Jersey region has the greatest population of any region in the United States and has the regional transportation network to support its transit needs. The region is also home to the Port of New York and New Jersey, which is the largest port on the East Coast and the third largest port in the United States. The proposed Project's use of the regional transportation network and the open waters in the apex of the New York Bight near the Port of New York and New Jersey has been evaluated against the current use of these networks and areas.

<u>Proposed Action:</u> Construction and decommissioning of the proposed Project would result in minor short-term disturbances to both the regional transportation network and navigation through the open waters off the coasts of New York and New Jersey. No long-term impacts are anticipated to occur to onshore or offshore transportation during operation and maintenance of the proposed Project.

<u>Alternative Deepwater Port Design:</u> Small increases in construction and support vessel traffic would be expected with the alternative deepwater port designs, particularly with construction of the artificial island. During decommissioning, there would be a slight increase in both the number of decommissioning

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vessels and their duration in the area compared to the proposed action. Impacts on marine transportation from the alternative deepwater port designs would be short-term, negligible, and adverse for construction and decommissioning, and long-term, negligible to minor, and adverse for operations. Despite the small differences in potential impacts, the magnitude and temporal aspect would not differ when comparing the alternative deepwater port designs with the proposed action.

<u>Alternative Anchor Design:</u> Since all vessel activities unrelated to the proposed Port would be prohibited within the Safety Zone, impacts on ocean uses would not be materially different between proposed anchoring alternatives. Installation of the gravity-based anchor would result in greater impacts on transportation due to the increased number of required vessel transits during construction.

Alternative Deepwater Port Locations and Associated Alternative Mainline Routes: Proposed onshore fabrication facilities associated with the proposed Project are minimal and limited to construction-related activities. The Applicant has not finalized the locations of the onshore proposed Project facilities; however, two potential locations for the pipe staging and CWC facility have been identified within existing industrial areas: Quonset Point, Rhode Island, and Port of Coeymans, New York. No significant modifications (e.g., facility expansion that would disturb previously undisturbed areas, wetland fill, river dredging, etc.) of either site are anticipated to accommodate the proposed Project. Upgrades such as site reinforcement or foundations may be required, but these site modifications would occur on previously disturbed areas. Because all of the onshore fabrication sites are located at existing industrial facilities, transportation resources would not be impacted.

The proposed and alternative Project locations would have similar impacts on commercial and recreational boating, commercial shipping, and existing traffic lanes and navigation. Neither alternative is located in a traffic lane or a location that directly impacts offshore navigation.

Mainline Route C-2 would have similar impacts as Mainline Route C-1 because it also crosses the Nantucket to Ambrose/Ambrose to Nantucket Traffic Lanes and the separation zone. Crossing of the traffic lane would result in short-term, temporary and minor impacts during construction of the proposed Project from increased vessel traffic within the TSS, but not significantly over the current number of vessels operating in the New York Bight.

<u>Vaporization Alternatives:</u> Based on the selection of the proposed Port facilities design, there are two alternatives for vaporization of the LNG prior to it entering the proposed Mainline system. The alternatives are open-loop vaporization and closed-loop vaporization, and neither would have an impact on transportation.

Air Quality: A combination of short- and long-term predominantly insignificant adverse impacts on air quality would be expected during construction, operation, and decommissioning of the proposed Project or the alternatives.

<u>Proposed Action:</u> Short-term, negligible, adverse impacts on air quality during construction would result from air emissions of NO_x, volatile organic compounds (VOCs), carbon monoxide (CO), sulfur dioxide (SO₂), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM₁₀), particulate matter with an aerodynamic diameter less than or equal to 2.5 microns (PM_{2.5}) and carbon dioxide equivalent emissions (CO₂e) from the operation of construction vessels and ancillary equipment on the vessels associated with construction activities. Long-term insignificant adverse impacts on air quality during operation would result from air emissions of NO_x, VOC, CO, SO₂, PM₁₀, PM_{2.5}, and CO₂e from the operation of the LNGRVs and offshore support vessels, and ancillary equipment associated with operation activities. Short-term, negligible, adverse impacts on air quality during decommissioning would result from air emissions of NO_x, VOC, CO, SO₂, PM₁₀, PM_{2.5}, and CO₂e from the operation of support vessels and ancillary equipment associated with decommissioning activities.

Several air quality dispersion models were used to predict ambient impacts from operation of the proposed Project. To assess nearby maximum impacts offshore, AERMOD was used to predict near field impacts (within 20 kilometers of the two STL Buoys) and to evaluate various operating loads of the boilers and engines. Since the proposed Project is located more than 13 nautical miles from shore, all AERMOD receptors were overwater. The Offshore and Coastal Dispersion (OCD) model was used to predict impacts at overwater and coastline receptors. The OCD model accounts for the thermal internal boundary layer that develops at the coastline, which impacts dispersion. An additional model, INPUFF, was used to model vessel emissions while in motion. This included the support vessel at Port and the LNGRVs in transit. This modeling of cumulative impacts was performed for all vessels associated with the proposed Project including the support vessel while patrolling as well as all LNGRV emissions, including those attributable to regasification, hoteling, and dynamic positioning, for comparison to the National Ambient Air Quality Standards (NAAQS)/New York Ambient Air Quality Standards (AAQS).

AERMOD-predicted impacts are greater than OCD-predicted impacts. Shoreline receptor impacts are less than overwater receptor impacts. With regard to Class I (pristine) area impacts, the proposed Project is not a relatively large source or located within 100 kilometers of a designated Class I area (National Park or Wilderness Area). Per the Federal Land Manager (FLM) guidance, a screening procedure was used to demonstrate that the proposed Project would not adversely affect the closest pristine area, the Brigantine Class I area.

Proposed Project decommissioning would result in comparable emissions to those described for the construction process.

<u>Alternative Deepwater Port Design:</u> Other port alternatives offer no benefit to air quality as mobile source emissions would be greater than the proposed Project due to the ship maneuvers and tugs that would be required during operations for these alternatives.

<u>Alternative Anchor Design:</u> Since all vessel activities unrelated to the proposed Port would be prohibited within the Safety Zone, impacts on ocean uses would not be materially different between proposed anchoring alternatives. Installation of the gravity-based anchor would result in greater impacts on air quality due to the increased number of required vessel transits during construction.

<u>Alternative Deepwater Port Locations and Associated Alternative Mainline Routes:</u> The pipeline laterals would be located in the seabed floor with no onshore component and therefore would have no measurable air quality impact.

<u>Vaporization Alternatives:</u> The open-loop system does not require burning natural gas to generate heat during regasification as compared to the proposed closed-loop system and is therefore, a lower impact alternative with regards to air quality.

Noise: A combination of short- and long-term, minor, adverse impacts from noise would be expected during proposed Project's construction, operation, and decommissioning or the alternatives. Airborne noise and marine noise were evaluated for this draft EIS. The highest sound pressure in the marine environment is expected to be pile driving during construction (if in the unlikely event that geotechnical conditions preclude use of suction anchors), which could be approximately 216 decibels (dB) re: 1 microPascal (μ Pa) @ 1 meter from the source.

<u>Proposed Action:</u> Construction of the proposed Project would result in an incremental increase in onshore sound level; however, impacts would be short-term and are not expected to be significant. All sound sources from the construction phase of the proposed Project are considered to have a minor impact on species of marine mammals, turtles, and fish; however, impacts are expected to be short-term and "harassment" (temporary threshold shift [TTS]) for all species is expected to be minor. Operation of the proposed Project would result in negligible noise impacts on onshore noise-sensitive areas (NSAs) due to the distance from shore. Additional trips made by the support vessel would be within existing navigation

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channels and the noise produced would not exceed that of existing vessel traffic. Construction of the proposed Project would have insignificant impacts on species of marine mammals, turtles, and fish relative to the "harm" criteria (permanent threshold shift [PTS]) as the greatest noise impact of underwater sound (use of driven pilings as a mooring anchoring system) has been removed from the proposed Project scope. Decommissioning of the proposed Project would result in similar impacts on those from the construction and operation phases of the proposed Project.

<u>Alternative Deepwater Port Design:</u> Other port alternatives offer no benefit to adverse impacts from noise as noise would likely be similar during construction and operation for each alternative due to construction methods, ship maneuvers and tugs that may be required during operations for these alternatives.

<u>Alternative Anchor Design:</u> Because impact piling was assessed to have the highest potential for sound generation (over the widest area) associated with the proposed Project, the decision was made that the anchors would be installed at the proposed Project using suction anchors. If necessary, driven piles could be used as an alternative to the suction anchors in the unlikely event geotechnical conditions preclude use of suction anchors. Several different anchor alternatives have been considered for the proposed Project, including driven piles, fluke anchors, gravity-based anchors, and grouted pile anchors. Underwater noise impacts would vary based on the alternative selected. As discussed previously, pile driving generates the highest underwater noise levels during construction, which is required when using driven piles. Other alternatives are installed using different methods, which would likely generate underwater noise but likely to a lesser extent; however, the risk of potential impacts must also be balanced against the effectiveness and reliability of the anchoring system.

<u>Alternative Deepwater Port Locations and Associated Alternative Mainline Routes:</u> The selected alternative deepwater port and pipeline route locations are within the same general vicinity as the proposed Project location, and construction, operation, and decommissioning activities would be similar for all locations. The alternative deepwater port locations and associated pipeline routes would not reduce impacts associated with noise during construction or operation. Biological impacts from noise generated during construction and operation at alternative deepwater port locations and associated pipeline routes would not differ compared to those at the proposed Project site.

<u>Vaporization Alternatives:</u> Based on the selection of the proposed Port facilities design, there are two alternatives for vaporization of the LNG prior to it entering the proposed Mainline system. The alternatives are open-loop vaporization and closed-loop vaporization, and neither would have an impact on overall Project noise.

Onshore Fabrication Sites: Proposed onshore fabrication facilities associated with the proposed Project are minimal and limited to construction-related activities. Two potential locations for the pipe staging and CWC facility have been identified within existing industrial areas: Ouonset Point, Rhode Island, and Port of Coeymans, New York. No significant modifications (e.g., facility expansion that would disturb previously undisturbed areas, wetland fill, river dredging, etc.) of either site are anticipated to accommodate the proposed Project. Upgrades such as site reinforcement or foundations may be required, but these site modifications would occur on previously disturbed areas. Because all of the onshore fabrication sites are located at existing industrial facilities, the following environmental resources would not be impacted: biological, cultural and geological resources; recreation and aesthetics; transportation; noise; land and ocean use. Activities associated with pipe coating and barge loading would produce emissions from CWC activities, cranes, cement trucks, barges and similar actions. If a temporary air permit is required for the CWC activities, then the Applicant, in conjunction with the selected CWC contractor, would procure the local air permit for this activity. Specific air permitting requirements would be identified upon selection of the pipe staging/CWC yard and contractor. The fabrication site host community would likely be economically stimulated by continuing work at the existing facility to support fabrication and construction of the proposed Project; therefore, construction activities would be expected to have a short-term, minor, beneficial economic impact.

Safety: While safety concerns might have minor, long-term, adverse or beneficial impacts on the decision-making processes of potential future proposals within the hazard area, there is no short-term or long-term, adverse, direct impact on activities outside the Safety Zone, NAAs, or ATBA. Mitigation measures would be developed to effectively reduce anticipated hazards to the general public and vessels associated with the proposed Project. The Safety Zone would serve to exclude non-project vessels and the general public from the highest hazard zones surrounding the proposed Port. To further enhance navigation safety, the Applicant may request mitigation measures such as NAAs and ATBA per the deepwater port regulations and International Maritime Organization (IMO) guidelines prior to commencement of construction. The NAA would serve to exclude all vessels from anchoring; thereby, protecting Project components (i.e., proposed Mainline) that do not lie within the Safety Zone. The NAAs would also serve to protect non-project vessels from incidental damage from snagging gear (other than anchors) on Port components, such as the STL Buoy and its mooring gear.

This draft EIS does not serve as the USCG's final safety screening for the proposed Project or the alternative Project locations. Should a license be issued, the Applicant would be required to submit a Final Port Operations Manual for review and approval by the USCG before LNG operations would commence. This manual would contain detailed plans and procedures to address routine operations and emergencies at the proposed Project location. The USCG's review would ensure that appropriate safety and security plans are included in the Port Operations Manual to minimize risk to proposed Project personnel, and the general public.

Mitigation

The DWPA requires that an applicant demonstrate that a proposed deepwater port would be constructed and operated using the best available technology, thereby, preventing or minimizing the adverse impact on the marine environment. Several mitigation measures were identified as a result of this draft EIS and are discussed in the following sections. These mitigation measures would also apply for alternatives discussed in detail. Specific mitigation measures can be found following the impact discussion for each resource in Section 4.0, Environmental Consequences of the Proposed Action and Action Alternatives.

Biological Resources: Mitigation measures are modifications to the proposed Project that are specifically implemented to reduce a potential environmental impact on a particular resource. Together, the procedures and measures outlined below would ensure that impacts on marine resources would be avoided or minimized by the Applicant during proposed Project construction, operation, and decommissioning:

Avoidance of Sensitive Habitats

- The proposed Mainline route would be selected based on avoiding or minimizing disturbance to sensitive biological resources (e.g., hard bottom areas, biogenic reefs, designated fishing areas, and submerged aquatic vegetation).
- The proposed Mainline and two pipeline laterals connecting to the two PLEMs would be installed utilizing DP vessels; stationary anchored vessels would be used only for installation of the subsea tie-in (SSTI).

• Impingement and Entrainment

- o To minimize the risk of entrainment of plankton, ballast water would be recirculated for all vessel cooling needs, thus eliminating any cooling water intake.
- o Intake velocity for ballast water and hydrostatic testing water would be less than 0.5 feet per second (ft/sec) to eliminate risk of impingement.

Noise

See mitigations below and detailed in Section 4.11.

• Turbidity and Seafloor Disturbance

- o To minimize seafloor disturbance, DP vessels would be used for all construction activities, except for anchored vessels installing the SSTI and hot-tap.
- Most of the proposed Mainline and laterals (99 percent of length) would be trenched using plow technology, and jetting would be used sparingly.

Water Quality

- The proposed Project would limit potential impacts on water resources by using closedloop STV methods instead of ORV open-loop technology to vaporize the natural gas.
- Biocide used in hydrostatic testing would be neutralized using hydrogen peroxide prior to discharge to minimize toxicity and no discharges would be made from the LNGRVs during cargo offloading operations.

• Ballast Water

 All proposed Project vessels would comply with a ballast water management plan and vessels bound for the proposed Port facilities would conduct a mid-ocean ballast water exchange; there would be no discharge of ballast water at the proposed Port facilities.

Lighting

- During construction, lighting for navigation and safe operations would be used when vessels are stationary where applicable. Lights would be well-shielded and directed downwards. Lights would not intentionally illuminate surrounding waters
- During proposed Project operation, lighting would be kept to a minimum; lights would be downshielded to illuminate the deck only; lights would not intentionally illuminate surrounding waters and would be turned off when not being used.

Vessel Strikes

 A Marine Mammal and Sea Turtle Vessel Strike Avoidance Plan has been prepared to decrease collision risk. Vessels would adhere to all speed restrictions, on site and in transit, and would always remain in navigation channels.

• Environmental Training and Plans

o All personnel working on the proposed Project would attend environmental training to emphasize the importance of minimizing impacts on marine resources.

Threatened and Endangered Marine Mammals, Sea Turtles, Fish and Birds: The mitigation measures for ESA-listed marine species would follow those outlined above and detailed in Section 4.2.7, as well as additional measures. Vessel interactions with protected species are of particular concern. In order to minimize and prevent collisions with protected species, a Marine Mammal and Sea Turtle Vessel Strike Avoidance Plan has been developed (Appendix K). Compliance with this plan would ensure the greatest reduction in collision risk. In addition to the slower speeds used upon approach to the proposed Project, all vessels would also adhere to any speed restrictions in place. For example, from 1 November to 30 April, all vessels within the Seasonal Management Area (SMA) and within 20 nautical miles of major ports must maintain speeds below 10 knots.

Essential Fish Habitat: The greatest mitigation measure taken to protect EFH is the selection of the proposed Mainline route. The proposed Mainline route avoids sensitive habitat, such as oyster reefs, hard bottom habitat, and submerged aquatic vegetation, which are important areas of biodiversity. Instead, the proposed Mainline is proposed for an area dominated by sand, which is a dynamic and resilient environment, with benthic community recovering quickly and completely. Additional measures, such as water intake reduction, impingement screens, and minimizing noise and lighting, would reduce local impacts on EFH. Impacts on EFH species would not be expected to be different than those described for

fisheries resources detailed in Section 4.2.3. Therefore, mitigation measures would be the same as those listed above and detailed in Section 4.2.8.

Cultural Resources: If the proposed Project cannot avoid targets identified in federal waters as potentially significant cultural resources, then further investigations would be required to determine if these targets represent potential historic properties. If the targets are identified as historic properties, an appropriate treatment plan would be developed and implemented prior to construction. The Applicant has developed an Unanticipated Discoveries Plan for the proposed Project. This plan should be reviewed by MARAD, NYSHPO, NJHPO, and BOEM. All proposed Project construction, operation, and decommissioning personnel should be familiar with the plan and the steps the Applicant has agreed to follow in the event of the discovery of a significant cultural resource including human remains.

Geological Resources: To minimize adverse impacts on geological resources, the Applicant would be required to use conventional structure removal methods that comply with ESA mitigation requirements at the time of decommissioning. Additionally, the Applicant would follow BOEM guidelines for the proposed Project's installation and operation.

Ocean Use, Land Use, Recreation, and Visual Resources: To minimize adverse impacts on ocean use, land use, recreation, and visual resources, the Applicant would issue Local Notice to Mariners (LNMs) to communicate proposed Project activities and would design cable crossings to avoid impacts on existing transmission cables in the ROI. Additionally, Marine Safety Information Broadcasts (MSIBs) would be issued whenever Port-related activities (e.g., construction, marine mammal monitoring or general Port operations) are occurring.

Socioeconomics: No mitigation is proposed to minimize adverse impacts on commercial and recreational fishing caused by establishing the Safety Zone exclusion areas. The Safety Zone would be small in size when compared to the overall fishing ground resource; therefore, any mitigation would provide little, if any, reduction in impact severity.

Transportation: To minimize potential impacts on marine transportation, although negligible, the Applicant would petition the USCG to establish a Safety Zone, NAAs, and ATBA per the procedures outlined in the USCG deepwater port regulations and IMO guidelines. In addition, as a service to marine traffic, the Applicant would request that the USCG issue a formal Notice to Mariners advising mariners of construction and any special precautions required. This would allow mariners that may potentially traverse the construction site to pre-plan an alternate route.

Air Quality: The following additional measures have been proposed as potential measures for mitigating and/or minimizing impacts on air quality:

- The proposed Project would obtain a pre-construction air permit prior to commencement of construction.
- The proposed Project would also apply for a Title V operating permit, which will specify emissions limitations, monitoring, recordkeeping, and reporting requirements.
- Emissions from marine vessels during construction would be minimized through the operation and maintenance of the marine engines in accordance with recommended manufacturer operation and maintenance procedures.
- The LNGRV boilers would be equipped with low NO_x burners to minimize emissions formation of NO_x and selective catalytic reduction (SCR) would be employed to further reduce NO_x emissions. Emissions of all other pollutants from the boilers would be minimized through firing of LNG and BOG and good combustion practices.

- The LNGRV generator engines would be exhausted to an SCR and oxidation catalyst would be employed to reduce NO_x, CO and VOC emissions. Emissions of all other pollutants from the engines would be minimized through firing of LNG and BOG and good combustion practices.
- Liberty would obtain discreet NO_x emission offsets to offset the construction-related NOx emissions. Sufficient ozone and non-ozone season offsets would be secured to offset the construction NO_x emissions that would occur during the ozone and non-ozone seasons.
- Greenhouse gas emissions would be limited through the use of best available control technology (BACT) controls included in the original March 2014 air permit application.

Noise: During the construction (and maintenance) phase, mitigation measures to minimize ambient and underwater noise from construction (or maintenance) activities would include the following:

- Construction activities would be scheduled to occur for the minimum practical, total duration to reduce the likelihood that protected species would be exposed to noise from construction activities:
- Dedicated and trained personnel would be assigned as protected species observers (PSOs)¹³ during construction activities;
- Exclusion and observation zones for marine mammals and turtles would be determined in consultation with NOAA Fisheries and monitored as follows:
 - o In the observation zone, the movement of marine species should be monitored to determine whether they are approaching or entering the exclusion zone;
 - O PSOs operate at all times during daylight hours (dawn to dusk i.e., from about 30 minutes before sunrise to 30 minutes after sunset) when construction activities are being conducted, unless conditions (fog, rain, darkness) make sea surface observations impossible. If conditions deteriorate during daylight hours such that the sea surface observations are halted, visual observations would resume as soon as conditions permit;
 - o If a marine mammal or sea turtle is observed approaching or within the exclusion zones (as outlined above), the observer would call for the shutdown of the construction operation. The vessel operator would comply with such a call by an on-watch visual observer; and,
- Start-up of the construction equipment would continue only after it is determined that a marine mammal or sea turtle has left the exclusion zone or has not been sighted for 30 minutes.

In addition to the above measures to mitigate and monitor noise impacts, the following measures would be implemented if pile driving (i.e., hydraulic impact hammer) is used to install the buoy anchors:

- A safety zone (exclusion and observation zones) would be established, in coordination with NOAA Fisheries, around pile driving activity to cover the 180 dB impact and buffer zones to account for animals that are approaching the impact zone. This safety zone would be monitored visually by NOAA Fisheries-approved PSOs for at least 30 minutes prior to the start of any piledriving activity. Pile-driving activity would not commence until the observer has declared the safety zone clear of sea turtles and whales;
- Each time a pile-driving hammer is started, dry-firing and ramping-up of the hammer would be conducted for at least 30 minutes to allow animals the opportunity to leave the area. Dry firing of a pile-driving hammer is a method of raising and dropping the hammer with no compression of

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¹³ A Prudent Mariner's Guide to Right Whale Protection (available at http://www.nero.noaa.gov/shipstrike/doc/mtr.html)

the pistons, producing a lower-intensity sound than the full power of the hammer. Ramp-up involves slowly increasing the power of the hammer and noise produced over the ramp-up period;

- A bubble curtain is also being considered as a potential noise mitigation measure during pile driving. Bubble curtains introduce specifically sized air bubbles into the water surrounding the pile in a controlled manner, thus dampening the shock waves and helping to minimize the effects on marine species. The feasibility and the effectiveness of the use of a bubble curtain in the area of the proposed Project will have to be analyzed prior to construction;
- Following the initial 30-minute observations for protected species, visual observations would occur continuously during daylight hours to monitor for sea turtles and whales in the area. If at any time animals are detected in the safety zone during pile driving, the pile-driving activity would cease until the animal has left the area of its own volition. Pile driving can resume (following ramp-up procedures) once the animal has been visually confirmed beyond the safety zone, or 30 minutes have passed without re-sighting the animal;
- If pile driving commences during daylight hours, pile driving may continue into nighttime hours provided that there has been no interruption in activity. However, pile driving would not be initiated during nighttime hours when visual clearance of the zone cannot be conducted;
- Records would be maintained of all sea turtle and marine mammal sightings in the area, including date and time, weather conditions, species identification, approximate distance from the pile, direction and heading in relation to the pile driving, and behavioral observations. When animals are observed in the safety zone, additional information would be recorded, including corrective actions taken (e.g., shutdown of the pile driver and duration of the shutdown), behavior of the animal, and time the animal spent in the safety zone; and
- Sound pressure levels would be monitored on the first day of pile-driving activity to ensure that the predicted 180 dB contour is accurate. The safety zone may be adjusted to accommodate any difference between predicted and measured sound levels.

During both construction and normal operations, all equipment would be operated according to manufacturers' recommendations, all installed sound-muffling devices would be maintained accordingly, and all vessel speed restrictions would be complied with:

- Specifications would call for equipment such as pumps, compressors, and generators to be installed on the LNGRVs in accordance with certifying entity or agency (Det Norske Veritas, American Bureau of Shipping, Lloyds Register, USCG) requirements for safety and operability;
- Location of most equipment within the LNGRV would reduce the noise emissions;
- Mufflers and shielding would be employed in accordance with certifying entity or agency requirements;
- The required separation distance for North Atlantic right whales of 500 yards or greater, in order to reduce disturbance and collision risks, would be followed as per 50 CFR 224.103 (62 *Federal Register* [FR] 6729 and 73 FR 60173);
- A SMA is designated within 20 nautical miles of the entrance to the Port of New York and New Jersey between November 1 and April 30;
- In order to comply with the Right Whale Ship Strike Reduction Rule (50 CFR 224.105), all vessels over 19.8 meters in overall length are to be restricted to 10 knots. Vessel speeds during construction activities are slow (less than 10 knots). When vessels are transiting to and from the proposed Project area, speeds of 10 knots or less would be maintained when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits (NOAA 2008). The vessels would attempt to route around the animals, maintaining a

- minimum distance of 100 yards whenever possible. If vessels transit the North Atlantic right whale SMA, 10-knot speeds would also be maintained;
- In order to avoid vessel strikes during transit and operations, the Early Warning System, Sighting Advisory System, and Mandatory Ship Reporting System notifying mariners of right whale presence would be monitored; and
- Vessel crews would report sightings of any injured or dead protected species immediately, regardless of whether the injury or death is caused by the proposed Project's vessels. Marine mammals would be reported to the U.S. Stranding Hotline and sea turtles would be reported to NOAA Fisheries Regional Offices. Any injured, dead, or entangled right whales would be immediately reported to the USCG via VHF Channel 16.

Cumulative Impacts

Implementation of the proposed action would result in incremental contributions to cumulative impacts across most resource areas. Proposed Project-related impacts would be cumulative with impacts associated with past, present, and reasonably foreseeable future OCS Program activities and existing and other proposed LNG deepwater ports. Cumulative impacts were analyzed only for those resource areas where a potential for impact was evident. Cumulative impacts from the proposed Project's construction, operation, and decommissioning are summarized by resource area below.

Water Resources: Impacts during construction, operation, and decommissioning would be localized and short-term to long-term, and the contribution to cumulative impacts would be minor. Impacts on water resources would primarily be related to water quality associated with routine discharges, seafloor disturbance, hydrostatic test/pigging discharges, and inadvertent spills. In addition to the vessel traffic already traversing the New York Bight, several other projects could impact water quality in the vicinity of the proposed Project, including Transco's Rockaway Delivery Point Project, the Long Island-New York City Offshore Wind Project, National Pollutant Discharge Elimination System (NPDES) outfalls that discharge into the New York Bight, navigational dredging and port expansion projects, and USACE projects relating to navigation and coastal storm damage reduction.

Biological Resources: During construction, operation, and decommissioning activities, water quality issues discussed above, noise, increased support vessel traffic, increased marine debris, and potential hazardous material spills would be short-term and would result in a minor contribution to cumulative impacts on biological resources. During operation, overlaps of impacts from other projects, such as Transco's Rockaway Delivery Point Project and the Long Island-New York City Offshore Wind Project, would include increased risk of collisions, impacts associated with marine debris from the increase in vessels traveling to and from each facility, and increased noise from maintenance and repair activities. Cumulative increases in operational vessel traffic would be moderate compared to ambient conditions in the ROI. Since any construction-related impacts would be temporary in duration and localized in scope, the long-term, cumulative effect would be expected to be minor.

Threatened and Endangered Marine Mammals, Sea Turtles, Fish and Birds: During construction, operation, and decommissioning activities, water quality and biological resources issues discussed above would result in a minor contribution to cumulative impacts on threatened and endangered species. During operation, overlaps of impacts from other projects, such as Transco's Rockaway Delivery Point Project and the Long Island-New York City Offshore Wind Project, would include increased risk of collisions, impacts associated with marine debris from the increase in vessels traveling to and from each facility, and increased noise from maintenance and repair activities. Cumulative increases in operational vessel traffic would be moderate compared to ambient conditions in the ROI. Since any construction-related impacts would be temporary in duration and localized in scope, the long-term, cumulative effect would be expected to be minor.

Cultural Resources: No high-probability areas for prehistoric archaeological sites were delineated in the sub-bottom profiler data for the proposed Project ROI. However, construction of the proposed Project could impact cultural resources that were not detected by surveys. Impacts during construction, if unanticipated discoveries occur, could result in a major incremental contribution to cumulative impacts on cultural resources. Adherence to the Unanticipated Discoveries Plan would help to reduce potential impacts.

Ocean Use, Land Use, Recreation, and Visual Resources: Impacts from construction and decommissioning activities would largely be short-term, and the contribution to cumulative impacts on ocean use, land use, recreation, and visual resources would be minor. Construction of the Long Island-New York City Offshore Wind Project and Rockaway Delivery Point Project could result in additional cumulative recreational impacts based on the extent of any restricted areas during construction and/or operation and due to loss of seafloor habitat for certain fish species. Transiting vessels may be required to avoid direct routes to continue with their voyage, possibly resulting in short delays in order to maintain a safe distance from the construction area and/or the Safety Zone, NAAs, and the ATBA.

During construction, vessels supporting construction and installation of proposed Project components would be visible from some locations along the coast of Long Island; however, these vessels would be within the context of ongoing traffic in the New York Bight and the contribution to cumulative impacts would be negligible. During operation, the LNGRVs would be at least 16.1 nautical miles from the coastline while offloading LNG and would be difficult to distinguish along the horizon; therefore, operation of the proposed Project would not contribute to cumulative impacts on visual resources.

Transportation: Construction, operation, and decommissioning of the proposed Project would result in a negligible increase in the ambient level of vessel traffic in the New York Bight, which is already one of the busiest ports in the United States. If constructed concurrently, construction vessel traffic from the Long Island-New York City Offshore Wind Project could increase the number of construction vessels in the vicinity of the proposed Project. However, vessel information has not been provided by the Long Island-New York City Offshore Wind Project.

Air Quality: Impacts on local and regional air quality could result from construction and operation of the proposed Project. Construction of the proposed Project would produce air emissions from diesel engines used for vessel propulsion and electric generation. Air quality modeling results indicated that proposed Project emissions would meet all New York and federal ambient air quality standards.

Noise: In addition to existing vessel traffic, construction of the proposed Project and the Long Island-New York City Offshore Wind Project would result in minor, short-term adverse cumulative impact on airborne noise if activities occurred concurrently, which is unlikely. Assembly and placement of proposed Project components in conjunction with construction vessel operation would result in noise that would exceed ambient conditions within the vicinity of the proposed Project. Airborne noise from construction activity would dissipate to ambient levels before reaching onshore receptors. Airborne noise produced by operation of the proposed Project, combined with noise associated with existing vessel traffic and noise associated with the Long Island-New York City Offshore Wind Project, could result in an adverse cumulative impact on human and biological resources. However, the proposed Project's distance from shore, ambient offshore noise levels and the buffer provided by the Safety Zone, NAAs, and the ATBA would represent a minor, long-term adverse cumulative impact associated with cumulative noise. In addition, the proposed Project is located within an area which is designated as a suitable site within for offshore renewable energy development. When considered together with the Long Island-New York City Offshore Wind Project, underwater noise generated by the turbines during operation can vibrate down the towers into the submerged foundations and into the surrounding water and seabed. In turn, this noise may be perceived by fish, sea turtles, and marine mammals within and outside of the Long Island-New York City Offshore Wind Project. Consequently, some species may avoid the project area while others may experience negligible impact. However, as operational noise from offshore wind turbines are generally

low level, no cumulative impacts are expected if both projects are constructed given the separation distances between the two facilities.

Safety: Potentially significant risks would be associated with the transportation and handling of LNG in association with the proposed Project. Operation of any deepwater port would increase the probability of LNG accidents. However, the development and implementation of design, operations, and Operations Manual along with the establishment of the Safety Zone, NAAs, and the ATBA around the proposed Project would minimize the likelihood of adverse impacts.

There are currently no deepwater ports or other fixed offshore structures in the New York Bight. However, there is currently a lease application for the Long Island-New York City Offshore Wind Project located within several of the same lease blocks as the proposed Project.

The addition of the proposed Project would minimally increase the safety and hazardous risk in the region. Any incident occurring at the proposed Project would rely on emergency procedures outlined in Liberty's Operations Manual. Despite heightened concerns, there would be no anticipated cumulative impacts on safety and hazardous risk as a result of the proposed Project.

Coordination of proposed Project activities during construction, operation, and decommissioning would include appropriate LNMs. Vessel traffic associated with other projects typically would not be in the general vicinity of the proposed Project. The exception to this would be the Long Island-New York City Offshore Wind Project. However, it is unlikely that these two projects would be constructed concurrently, thereby reducing potential impacts during construction.